SELECTED WATER RESOURCES ABSTRACTS

VOLUME 7, NUMBER 4
FEBRUARY 15, 1974

W74-01651 -- W74-02150

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SELECTED
WATER RESOURCES ABSTRACTS

A Semimonthly Publication of the Water Resources Scientific Information Center,
Office of Water Resources Research, U.S. Deoartment of the Interior

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The Secretary of the U. S. Department of the Interior has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through August 31, 1978.

As the Nation's principal conservation agency, the Department of the Interior has basic responsibilities for water, fish, wildlife, mineral, land, park, and recreational resources. Indian and Territorial affairs are other major concerns of America's "Department of Natural Resources."

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FOREWORD

Selected Water Resources Abstracts, a semimonthly journal, includes abstracts of current and earlier pertinent monographs, journal articles, reports, and other publication formats. The contents of these documents cover the water-related aspects of the life, physical, and social sciences as well as related engineering and legal aspects of the characteristics, conservation, control, use, or management of water. Each abstract includes a full bibliographical citation and a set of descriptors or identifiers which are listed in the **Water Resources Thesaurus.** Each abstract entry is classified into ten fields and sixty groups similar to the water resources research categories established by the Committee on Water Resources Research of the Federal Council for Science and Technology.

WRSIC IS NOT PRESENTLY IN A POSITION TO PROVIDE COPIES OF DOCUMENTS ABSTRACTED IN THIS JOURNAL. Sufficient bibliographic information is given to enable readers to order the desired documents from local libraries or other sources.

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To provide WRSIC with input, selected organizations with active water resources research programs are supported as "centers of competence" responsible for selecting, abstracting, and indexing from the current and earlier pertinent literature in specified subject areas.

Additional "centers of competence" have been established in cooperation with the Environmental Protection Agency. A directory of the Centers appears on inside back cover.

Supplementary documentation is being secured from established discipline-oriented abstracting and indexing services. Currently an arrangement is in effect whereby the BioScience Information Service of Biological Abstracts supplies WRSIC with relevant references from the several subject areas of interest to our users. In addition to Biological Abstracts, references are acquired from Bioresearch Index which are without abstracts and therefore also appear abstractless in SWRA. Similar arrangements with other producers of abstracts are contemplated as planned augmentation of the information base.

The input from these Centers, and from the 51 Water Resources Research Institutes administered under the Water Resources Research Act of 1964, as well as input from the grantees and contractors of the Office of Water Resources Research and other Federal water resources agencies with which the

Center has agreements becomes the information base from which this journal is, and other information services will be, derived; these services include bibliographies, specialized indexes, literature searches, and state-of-the-art reviews.

Comments and suggestions concerning the contents and arrangements of this bulletin are welcome.

Water Resources Scientific Information Center
Office of Water Resources Research
U.S. Department of the Interior
Washington, D. C. 20240

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02 WATER CYCLE
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ABSTRACT SOURCES

SELECTED WATER RESOURCES ABSTRACTS

02. WATER CYCLE

2A. General

ESTIMATING THE LAND SLOPE OF MOUNTAIN WATERSHEDS,
Forest Service (USDA), Moscow, Idaho. Forestry Sciences Lab.
N. Bethlahmy.
Journal of Soil and Water Conservation, Vol 28, No 5, p 229-230, September - October 1973. 2 fig, 2 tab, 3 ref.

Descriptors: *Terrain analysis, *Topography, *Slopes, Geomorphology, Rainfall-runoff relationships, Water ballance, Maps, Mapping, *Watersheds (basins).
Identifiers: *Mountain watersheds.

Land slope is one of many elements that affect a watershed's regime. Its effect is particularly significant in mountainous areas, solar heat input. Solar heat controls the rate of snowmelt as well as evapotranspiration. The average land slope of watershed can be determined by detailed analysis of a contour map. If only a planimetric map is available, a method is given that will result in land slope values that approximate closely those obtained from analyses of contour maps. The basis for this method is the relation between the length of a mountain stream and the circumference of its watershed. An empirical equation is given to satisfy both the theoretical constraints and the requirements of data that characterize mountainous watersheds formed by fluvial erosion. The results of using this equation on data for mountain watersheds in Idaho were compared with the results from an analysis of a contour map. The correlation coefficient of the compared values is 0.93 (significant at the 1% level). (Knapp-USGS)
W74-01715

CONCEPTUAL MODELS: 2. FLUVIAL-ALLUVIAL, GLACIAL, LACUSTRINE, DESERT, AND SHOREZONE (BAR-BEACH-DUNE-CHENIER) SEDIMENTARY ENVIRONMENTS,
Laurentian Univ., Sudbury (Ontario). Dept. of Geology.
For primary bibliographic entry see Field 02J.
W74-01940

PALEOHYDROLOGIC IMPLICATIONS OF SOME PLUVIAL LAKES IN NORTHWESTERN NEW SOUTH WALES, AUSTRALIA,
Wisconsin Univ., Milwaukee. Dept. of Geography.
For primary bibliographic entry see Field 02H.
W74-01959

THE SIMULATION OF SUBSURFACE EFFECTS ON THE DIURNAL SURFACE THERMAL REGIME IN COLD REGIONS,
Michigan Univ., Ann Arbor. Dept. of Geography.
For primary bibliographic entry see Field 02C.
W74-01988

AQUATIC AND ATMOSPHERIC SIMULATION,
California Univ., Livermore. Lawrence Livermore Lab.
For primary bibliographic entry see Field 05B.
W74-02003

HYDROLOGIC REPORT LITTLE CALUMET RIVER AND TRIBUTARIES, PART I.
Horner and Shifrin, Inc., St. Louis, Mo.
For primary bibliographic entry see Field 02E.
W74-02127

2B. Precipitation

RADAR INVESTIGATION OF SUMMERTIME LAND/LAKE RAINFALL VARIATIONS OVER LAKE MICHIGAN,
Wisconsin Univ., Milwaukee. Dept. of Geography.
J. F. Chandik, and W. A. Lyons.
Available from the National Technical Information Service as PB-225 430/8, $3.50 in paper copy; $1.45 in microfiche. University of Wisconsin Water Resources Center, Madison, Technical Report, WIS WRC 73-10, 1973. 53 p, 19 fig, 1 tab, 29 ref. OWRR A-036-WIS (1), 14-31-0001-3550.

Descriptors: *Rainfall intensity, Atmosphere, *Radar, Climatology, *Air masses, *Lake Michigan, Climatic data, *Precipitation (Atmospheric).

A detailed analysis of gain-stepped WSR-57 radar data shows that warm season precipitation patterns over the southern basin of Lake Michigan (based on areal echo frequency distributions) are on the whole unaffected by the presence of a large cold water body. While precipitation echo frequencies associated with air mass shower activity are 13% lower over the lake compared to those over the land portion of the basin, air mass precipitation accounts for less than 10% of all warm season precipitation over the lake portion of the southern Lake Michigan basin. However, when radar echoes for all warm season precipitation types, e.g., cold front, squall line, and overrunning are investigated, overlake echo counts are slightly greater than land echo counts for comparative land and lake test areas. Regions of maximum echo occurrence within 100 n. mi. of Chicago show a persistent orientation similar to climatologically estimated isohyetal patterns for a non-lake effected situation. A hint of increased echo frequencies northeast of the Chicago-Gary industrial complex suggests further studies to ascertain the possiblity of inadvertent weather modification.
W74-01661

ESTIMATION OF THE BACKGROUND CONTAMINATION OF THE ATMOSPHERE FROM THE CHEMICAL COMPOSITION OF PRECIPITATION,
Main Geophysical Observatory, Leningrad (USSR).
For primary bibliographic entry see Field 05A.
W74-01769

CLIMATE AND GRASSLANDS IN SOUTH AMERICA, (IN SPANISH),
J. Blydenstein.
Turrialba. Vol 22, No 3, p 258-262. 1972, Illus. (English summary).
Identifiers: Argentina, Brazil, *Climate, Forage, *Grasslands, Livestock, Production, Venezuela, *South America.

A climatic classification related to dry seasons was developed, calculating the total precipitation during the 3 driest months and the percentage of the total precipitation which falls during the 3 driest and 3 wettest months. The climate of the tropical savanna regions has many semi-arid characteristics, with their consequent limitatiions to production of forage. The most productive livestock regions in South America are the humid temperate areas, such as the Argentine Pampa, with no well-defined dry season and mild winters. The areas which come closest to this situation are located in the humid tropics, such as the area south of Lake Maracaibo in Venezuela or the Amazon basin in Brazil.--Copyright 1973, Biological Abstracts, Inc.
W74-01781

LIDAR EVALUATION OF FOG DISSIPATION TECHNIQUES,
Stanford Research Inst., Menlo Park, Calif.
W. Viezee, J. Oblanas, and R. T. H. Collis.
Available from NTIS, Springfield, Va 22151 AD-758 767 Price $5.45. Final Contract Report to Air Force Cambridge Research Laboratories (AFCRL-TR-73-0052), February 1973. 116 p, 19 fig, 1 tab, 7 ref, append. AFCRL Contract F19628-72-C-0018.

Descriptors: *Weather modification, *Fog, *California, Methodology, Heat, Propane, Data collections, Testing procedures, Evaluation, Aircraft, Meteorology.
Identifiers: *Fog dispersal experiments.

During July 1972, laser radar (lidar) observations were made in support of a thermal fog dissipation program conducted by the Air Force at Vandenberg AFB. The program was designed to test the merging heat plume concept as a practical and efficient method of warm-fog dispersal. The ground-based heating system consisted of 213 liquid propane burners arranged in four lines perpendicular to the prevailing wind direction. The heat tests, conducted whenever fog reduced the horizontal visibility to less than 1/2 mile (800 m), consisted of lighting various rows of burners at various burner intensities and spacings under various meteorological conditions (primarily wind speed variations). Profiles of atmospheric backscatter vs. range were observed with a ruby lidar at a point downwind from the ground-based heating system by firing every three seconds while scanning in a vertical plane normal to the wind. Lidar data were collected during conditions of dense, natural fog and during conditions when merging heat plumes interacted with the fog to produce large increases in visibility. The lidar data are analyzed in terms of digital cross sections of visual range that provide information on the intensity and spatial extent of the clearings produced by the heating system. (Woodard-USGS)
W74-01888

2C. Snow, Ice, and Frost

SATELLITE GEOLOGICAL AND GEOPHYSICAL REMOTE SENSING OF ICELAND--PRELIMINARY RESULTS FROM ANALYSIS OF MSS IMAGERY,
Geological Survey, Reston, Va. EROS Program Office.
R. S. Williams, Jr., A. Bodvarsson, S. Fridriksson, and G. Palmason.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 317-127, 1973. 3 fig, 14 ref.

Descriptors: *Remote sensing, *Satellites (Artificial), *Geomorphology, *Geologic mapping, Terrain analysis, Valcanoes, Surveys, Glaciers, Glaciation, Sediments, Sedimentation, Erosion, Glacial drift, Coasts, Data collections, Environmental effects, Snow cover, Mapping, Monitoring.
Identifiers: ERTS, *Iceland.

A multidisciplinary research effort in Iceland is directed at an analysis of MSS imagery from ERTS-1 to study a variety of geologic, hydrologic, oceanographic, and agricultural phenomena. Recent lava flows can be delineated from older flows at Askja and Kela. MSS imagery and VHRR visible and infrared imagery recorded the volcanic eruption on Heimacy, Vestmann Islands. Coastline changes, particularly changes in the position of bars and beaches along the south coast, are mappable. Areas covered with new and residual snow can be mapped. Sediment plumes from the discharge of glacial rivers along the south coast can be delineated. Changes in position of rivers, changes in size of lakes, and the occurance of new

lakes may be mapped. Low sun-angle imagery, particularly of snow-covered terrain, markedly enhances the morphologic expression of constructional glacial and volcanic landforms. MSS color composites permit regional mapping of the gross distribution of vegetation. ERTS-1 imagery provides a means of updating various types of maps and will permit the compilation of special maps specifically aimed at dynamic environmental phenomena. (See also W74-01633) (Knapp-USGS)
W74-01699

PRELIMINARY ASSESSMENT OF GEOLOGICAL APPLICATIONS OF ERTS-1 IMAGERY FROM SELECTED AREAS OF THE CANADIAN ARTIC,
Gregory Geoscience Ltd., Ottawa (Ontario).
A. F. Gregory.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 329-343, 1973. 8 fig, 5 ref.

Descriptors: *Remote sensing, *Satellites (Artificial), *Geologic mapping, *Canada, Structural geology, Exploration, Geology, Data collections, Aerial photography, Surveys.
Identifiers: ERTS.

One immediate benefit from ERTS is improved efficiency in planning for and operation of programs of regional geological mapping, Images were acquired under both summer and early winter conditions in two areas of the Canadian Arctic. Thin snow cover suppresses terrain noise from vegetation, soils, rocks and water and thus presents a uniformly reflective surface with irregularities that have geological and geomorphological significance. Low inclination of the sun accentuates textural patterns and surface irregularities with shadowing analogous to side-looking radar. In conjunction, these two conditions of early winter serve to emphasize structure, relief, and texture of the terrain surface. Where such features reflect rock type, geological formations may be broadly classified and their boundaries delineated. Summer imagery serves to delineate soil-vegetation complexes and the boundaries of water bodies more precisely than winter imagery. Immediate benefits can be achieved by simple interpretation of ERTS images to provide information about the structure and disposition of geological formations. (See also W74-01633) (Knapp-USGS)
W74-01700

EXPLOITATION OF ERTS-1 IMAGERY UTILIZING SNOW ENHANCEMENT TECHNIQUES,
Earth Satellite Corp., Washington, D.C.
F. J. Wobber, and K. R. Martin.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellites-1: Vol I--Technical Presentation, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 345-351, 1973. 1 fig, 5 ref.

Descriptors: *Remote sensing, *Satellites (Artificial), *Terrain analysis, *Snow cover, *Geologic mapping, Structural geology, Topography, Geomorphology, Data collections, Data processing.
Identifiers: ERTS.

Photogeological analyses of ERTS-1 imagery of snow-covered terrain within the ERAP Feather River site and within the New England test area provide new fracture detail which does not appear on available geological maps. Comparative analysis of snow-free ERTS-1 images demonstrates that MSS Bands 5 and 7 supply the greatest amount of geological fracture detail. A heavy blanket of snow (9 inches) accentuates major structural features, while light snow (1 inch) accentuates more suble topographic expressions. The technique of snow enhancement appears to afford a simple (and no-cost) means of edge enhancement during the snow-covered periods. Increased tonal contrasts along the snow-covered/snow-free interface provide a form of natural edge enhancement for low resolution imagery. Monitoring variation in snow melting and accumulation can supply unique fracture data unavailable during other seasons. (See also W74-01663) (Knapp-USGS)
W74-01701

GLACIATION OF NORTHERN WYOMING INTERPRETED FROM ERTS-1,
Wyoming Univ., Laramie. Dept. of Geology.
R. M. Breckenridge.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 363-369, 1973. 2 fig, 6 ref.

Descriptors: *Remote sensing, *Satellites (Artificial), *Glaciation, *Wyoming, Geomorphology, Geologic mapping, Topography, Terrain analysis, Data collections, Data processing, Snow cover, Snowpacks, Glaciers.
Identifiers: ERTS.

Using ERTS imagery, a number of alpine glacial features can be recognized and mapped successfully. Although the Wyoming mountains are generally regarded as the type locality for Rocky Mountain glaciation some areas have not been studied from a glacial standpoint because of inaccessibility or lack of topographic control. ERTS imagery provides an excellent base for this type of regional geomorphic study. A map of maximum extent of Wisconsin ice, flow directions, and major glacial features was compiled from interpretation of the ERTS imagery. Features which can be mapped are large moraines, outwash fans, and terraces. Erosional ice features including cirques, large scale grooves, U-shaped valleys, and glacial lakes are useful in delineating glaciated areas. Present-day glaciers and snowfields are easily discriminated and mapped. ERTS provides a quick and effective method for detection of changes and inventory of these vital resources. (See also W74-01663) (Knapp-USGS)
W74-01703

NORTH LOOKS AT WASTE WATER CLEANUP NEEDS.
For primary bibliographic entry see Field 05D.
W74-01868

FLOW NEAR THE MARGIN OF THE BARNES ICE CAP, AND THE DEVELOPMENT OF ICE--CORED MORAINES,
Minnesota Univ., Minneapolis. Dept. of Geology and Geophysics.
R. LeB. Hooke.
Geological Society of America Bulletin, Vol 84, No 12, p 3929-3948, December 1973. 9 fig, 1 tab, 26 ref. NSF Grant GA-19310.

Descriptors: *Glaciers, *Glacial drift, Arctic, *Canada, Glaciation, Sediment transport, Movement, Rheology, Regimen.
Identifiers: *Barnes Ice Cap, Baffin Island, *Ice-cored moraines.

A wedge of deformed superimposed ice is present beneath glacial ice at the margin of the Barnes Ice Cap, Baffin Island, Canada. Where the glacial ice contains debris, the contact between the two is marked by a ridge-shaped ice-cored maraine, 100 to 150 m from the margin. Where the glacial ice contains little or no debris, the surface profile is smooth and convex upward. Measurements of surface flow and ablation rates on both types of margins suggest that a general advance of the glacier is necessary to incorporate such superimposed ice into the margin, and hence, to instigate development of this type of ice-cored moraine. Debris that slumps from the moraine onto forelying superimposed ice may become buried by new superimposed ice and be reincorporated into the margin. During a subsequent advance, this debris layer will be deformed, possibly overturned, and finally brought back to the surface where it will melt to form a new ridge. Such recycling of debris may result in very complex structures in an ice-cap margin. (Knapp-USGS)
W74-01955

THE SIMULATION OF SUBSURFACE EFFECTS ON THE DIURNAL SURFACE THERMAL REGIME IN COLD REGIONS,
Michigan Univ., Ann Arbor. Dept. of Geography.
S. I. Outcalt.
Arctic. Vol 25, No 4, p 305-307. 1972. Illus.
Identifiers: Climates, *Cold regions, Diurnal, Radiation, *Simulation, Subsurface, *Thermal regimes.

Melting rock glacier ice cores, massive ground ice and active layer depth variations contribute significantly to the surface thermal regime variance when these features are relatively close to the surface. Lake and sea ice depth variations with either spatially homogeneous light snow cover or none should be detectable particularly where there are large depth variations. Whereas surface climate simulation presents an explicit method of estimating the influence of a wide range of surface environmental factors, specifically albedo, emissivity, substrate radiation extenction (ice and snow), roughness, wetness, stratified thermal properties, slope and exposure, the method would appear to be extremely valuable in the experimental design and hypothesis formation phases of thermal mapping investigations in cold regions. Furthermore as the strategy can be employed to estimate the sensitivity of the surface thermal response to individual environmental factors to the method dictates the ground truth requirements for exploratory investigations. Lastly as process and environmental information becomes available the strategy can be used to construct explicit deterministic physical models of the spatial and temporal variance of surface thermal response which can be employed as an analytical portion of a remote sensing reconnaissance system specific to trafficability and site studies in arctic and alpine environments. In short, the capacity for modelling the surface thermal response as a function of the surface and substrate environment vastly increases the accessible information content of thermal IR maps particularly where these are acquired at several times during the diurnal cycle.--Copyright 1973, Biological Abstracts, Inc.
W74-01988

THE ARCTIC DREDGE, A BENTHIC BIOLOGICAL SAMPLER FOR MIXED BOULDER AND MUD SUBSTRATES,
National Museum of Natural Sciences, Ottawa (Ontario).
A. H. Clarke.
J Fish Res Board Can. Vol 29, No 10, p 1503-1505. 1972, Illus.
Identifiers: *Arctic, *Benthic sampler, Boulder, *Dredges, Mud substrates, Sampling.

Benthic biological dredges of a new design were used successfully on ice-rafted archibenthal and abyssal sediments of boulders and mud. The dredge is kite-shaped, of massive construction, and features a single point for cable attachment and a removable cannister for specimen retrieval. Experience in Baffin Bay, the Labrador Sea, and the Icelandic Shelf indicates that the arctic dredge is a reliable tool for arctic and subarctic research.--Copyright 1973, Biological Abstracts, Inc.
W74-02085

THE TUNDRA MICROCLIMATE DURING SNOW-MELT AT BARROW, ALASKA,
Alaska Univ., College. Geophysical Inst.
G. Weller, S. Cubley, S. Parker, D. Trabant, and C. Benson.
Arctic. Vol 25, No 4, p 291-300. 1972.
Identifiers: *Alaska (Barrow), Climates, *Microclimate, *Tundra, Snow-melt, Heat balance, Evaporation.

The microclimate of the tundra during spring of 1971 (29 May to 17 June) at Barrow, Alaska, is described and analyzed in terms of the heat balance at the terrestrial surface and the effects of terrain parameters on the heat balance components. Changes through the snowmelting period are large. Within 2 wk 35 cm. of snow are removed, soil interface temperatures increase by 15 degrees C, and the dry snow environment is replaced by a saturated water-soaked tundra surface. As a result, evaporation rates are high: up to 6 mm day -1 occurs immediately after the snow melt. The latent heat required for this is 40 times higher than during the pre-melting period.--Copyright 1973, Biological Abstracts, Inc.
W74-02095

2D. Evaporation and Transpiration

INCREASE IN FOLIAR TRANSPIRATION AS A RESULT OF TRAUMATISM IN THE AMPHISTOMATIC PLANTS,
Institut Pasteur, Paris (France).
J. Sivadjian.
C R Hebd Seances Acad Sci Ser D Sci Nat, Vol 275, No 22, p 2497-2499, 1972, Illus.
Identifiers: *Amphistomatic plants, Bean, *Hygrophotographic techniques, *Transpiration (Foliar), Traumatism.

The hygrophotographic technique which allows simultaneous observation of results on both sides of leaves was used to study the bean which has 2-side transpiration. The separation of the leaf from the stem by sectioning resulted in an increased opening of stomata. This modification, reflected in the increased transpiration of the sectioned leaves, can now be identified by the hygrophotographic technique. In amphistomatic leaves the phenomenon is very marked on the upper side.--Copyright 1973, Biological Abstracts, Inc.
W74-01735

GROWTH PRODUCTIVITY AND EVAPOTRANSPIRATION, DEPENDING ON SOIL MOISTURE UPON IRRIGATING A PEPPER (CAPSICUM ANNUUM L.) CULTIVATION, (IN ITALIAN),
Padua Univ. (Italy). Istituto di Agronomia Generale e Coltivazioni Erbacee ed Arboree.
For primary bibliographic entry see Field 03F.
W74-01762

COMPARATIVE STUDY BETWEEN THE EVAPORATION CALCULATED BY VARIOUS FORMULAS AND PAN EVAPORATION MEASURED IN THREE TROPICAL AREAS, (IN SPANISH),
Narino Univ., Pasto (Columbia). Facultad de Ciencias Agriculturas.
B. L. Legarda, and W Forsythe.
Turrialba. Vol 22, No 3, p 282-292. 1972. (English summary).
Identifiers: Comparative study, *Evapotranspiration, *Evaporation, Formulas, Measured, *Pan evaporation, Transpiration, *Tropical areas.

This study compared the evaporation calculated by the formulas of Blaney-Criddle, Garcia-Lopez, Grassi-Christiansen, Holdridge, Thornthwaite, Papadakis and Van Bavel-Penman, with data of pan evaporation of 3 tropical areas: Turrialba and Alajuela in Costa Rica and Monymusk in Jamaica. The available data of pan evaporation was used as a basis to evaluate the formulas since good correlation exists between pan evaporation and potential evapotranspiration in various places. The following evaluations were made: correlation which was used as a measure of the accuracy of the formula; analysis of variance in which pan evaporation data was used as a basis for its calculation; the ratio between the calculated evaporation and pan evaporation for each month was determined and designated the A factor, and the average for each local was determined. The local average of the A factor was applied to calculations of the formulas and an analysis of variance was repeated and in this way the deviation of the adjusted calculations was determined. The following formulas were chosen as having the best characteristics for the region studied: Garcia-Lopez which had good correlation and agreement; Papadakis which had fair correlation and agreement, and in addition, the agreement improved by 68% on applying the relatively constant regional A factor of 0.82; and Van Bavel-Penman which had the highest average correlation, but poor agreement. However, the application of a considerably constant regional A factor of 0.56 improved the agreement by 294%.--Copyright 1973, Biological Abstracts, Inc.
W74-01870

HEAT AND WATER VAPOR EXCHANGE BETWEEN WATER SURFACE AND ATMOSPHERE,
Cornell Univ., Ithaca, N.Y. School of Civil and Environmental Engineering.
W. H. Brutsaert.
Environmental Protection Agency, Technology Series Report EPA-R2-73-259, May 1973. 59 p, 10 fig, 3 tab, 6 ref. EPA Project 16130 DIP.

Descriptors: *Evaporation, *Heat transfer, *Air-water interfaces, Estimating equations, Mass transfer, *Water cooling, Diffusion, *Water vapor, Model studies, Evapotranspiration, *Diffusivity, Turbulent flow, Thermal pollution.
Identifiers: *Turbulent diffusion models.

The physical and mathematical aspects of simultaneous turbulent heat and water vapor exchange between a large open water body and the surrounding atmosphere were studied. Thus analytical and numerical solutions were developed for various conditions of fetch, surface roughness, atmospheric stability, etc., that are likely to be of physical importance. One of the main findings was that in spite of some theoretical limitations the semi-empirical turbulent diffusion model provides a method for the prediction of heat and water vapor transfer that should be useful for engineering calculations. Although the interaction between momentum, sensible heat and water vapor is considerable, for evaporation or cooling calculation purposes it is probably permissible to uncouple their transfer mechanisms provided the water surface temperature is known and the averaging period uner consideration is of the order of, say, a week. In addition the validity of the semi-empirical assumption in the near-water surface layer was analyzed by determining the anisotropy of the eddy diffusivity, the effects of radiative transfer and of water wave action on the eddy diffusivity. Finally, a practical method was developed to determine evapotranspiration from the surrounding land surface based on the geostrophic drag concept. (EPA)
W74-01930

TRANSPIRATION OF ATRIPLEX CONFERTIFOLIA AND EUROTIA LANATA IN RELATION TO SOIL, PLANT AND ATMOSPHERIC MOISTURE STRESSES,
San Diego State Coll., Calif. Dept. of Biology.
R. T. Moore, R. S. White, and M. M. Caldwell.
Can J Bot. Vol 50, No 12, p 2411-2418. 1972. Illus.
Identifiers: Atmospheric conditions, *Atriplex-confertifolia, *Eurotia-lanata, Leaf, Light, Moisture, Phenology, Seasons, Speed, Stresses, Temperature, *Transpiration, Wind, *Soil-water-plant relationships, Multiple regression analysis.

A. confertifolia and E. lanata plants were studied in the field and laboratory under controlled conditions of temperature and vapor pressure deficit with uniform wind speed and light intensity and various levels of water stress. Multiple regression analysis indicated that under both field and laboratory conditions, vapor pressure deficit and water stress were significant factors influencing transpiration. Phenological stage was also a major factor in the transpirational relationships of both species in the field. Transpiration rates under comparable conditions tended to be higher for Eurotia than for Atriplex on a leaf dry weight basis with less pronounced differences on a leaf area basis. However, in the latter part of the summer, transpiration rates of Eurotia decreased markedly while Atriplex tended to maintain active transpiration. Under laboratory conditions, both species exhibited transpiration at plant moisture stress values as great as 115 bars.--Copyright 1973, Biological Abstracts, Inc.
W74-01990

2E. Streamflow and Runoff

THE ROLE OF MOLECULAR DIFFUSION IN DISPERSION THEORY,
Hebrew Univ., Jerusalem (Israel).
Z. Weinberger, and S. Mandel.
Journal of Hydrology, Vol 19, No 4, p 361-365, August 1973. 1 fig, 6 ref.

Descriptors: *Mixing, *Dispersion, *Diffusion, *Groundwater movement, Porous media, Turbulent flow, Equations, Tracers, Mathematical studies, *Open channel flow.

The analytic derivations of the equations governing dispersive flow assume that different solutions entering an interstitial flow channel are completely mixed at the exit node of the flow channel. The physical mechanisms which can effect this mixing are turbulence and molecular diffusion between the solutions in the channel. At the interstitial velocities ordinarily encountered in groundwater flow, turbulence is not effective as a mixing mechanism whereas molecular diffusion is. For the equations of dispersive flow to be valid the flow velocities must be sufficiently large so that molecular diffusion can be neglected when compared to the dispersion due to the random hydraulic flow through the elementary channels. This velocity is about 10 cm per day. (Knapp-USGS)
W74-01713

DYNAMICS AND THERMAL REGIMEN OF RIVER FLOWS (DINAMIKA I TERMIKA RECHNYKH POTOKOV).
Akademiya Nauk SSSR, Moscow. Institut Vodnykh Problem.

Izdatel' stovo 'Nauka', Moscow, K. I., Rossinskiy, editor, 1972. 144 p.

Descriptors: *River flow, *Hydrodynamics, *Temperature, Turbulence, Turbulent flow, Waves (Water), Winds, Dispersion, Diffusion, Channels, Canals, Erosion, Mudflows, Fluvial sediments, *Sediment transport, Saltation, Suspended solids, Sediment discharge, Sediment control, Bodies of water, Ice.
Identifiers: *USSR.

Preliminary results are presented of theoretical and experimental investigations conducted in 1969-70 at the Department of Hydrophysics of the USSR Academy of Science's Institute of Water Problems. The papers presented are grouped

under 3 subject headings: dynamics and thermal regimen of rivers in connection with water-resource use (4 papers); movement of river sediments and formation of channels (6 papers); and investigations of turbulent and wave flows (3 papers). Topics of individual papers include: hydrodynamics of river flows; ice and thermal regimes of rivers, lakes, and reservoirs; a theory of suspended-sediment movement; saltation of river sediments; deformations of artificial channels in sandy materials; mudflow control on the Zailiski Ala Tau mountain range; and turbulent structure of plane and axisymmetric air flows. (Josefson-USGS)
W74-01722

NATURE OF SEVEN-YEAR CYCLES IN LONG--TERM FLUCTUATIONS OF VOLGA RUNOFF (O PRIRODE SEMILETNEY TSIKLICHNOSTI V MNOGOLETNIKH KOLEBANIYAKH STOKA VOLGI),
Akademiya Nauk SSSR, Moscow. Institut Biologii Vnutrennykh Vod.
N. P. Smirnov, E. I. Sarukhanyan, and O. F. Kondratsova.
In: Organicheskoye veshchestvo i elementy gidrologicheskogo rezhima volzhskikh vodokhranilishch; Akademiya Nauk SSSR Institut Biologii Vnutrennikh Vod Trudy, No 23 (26), p 163-175, Leningrad, 1972. 10 fig, 3 tab, 12 ref.

Descriptors: *Runoff, *Rivers, *Fluctuations, *Cycles, Discharge (water), Air circulation, Atmospheric pressure, Winter, Correlation analysis.
Identifiers: *USSR (Volga River), Spectrograms.

The character of Volga runoff fluctuations which have a period of about 6-7 years is examined. A relation is established between these fluctuations and nutations of the pole of Earth rotation. Maximum values of average annual discharges at Volga gaging stations in a 6-7 year cycle are observed in years when the radius vector of the pole of rotation crosses the Greenwich meridian in winter months. A detailed analysis is made of the relation of water discharges in the Volga basin in a 6-7 year cycle to the character of atmospheric circulation in winter. (See also W74-01723) (Josefson-USGS)
W74-01727

INDEX OF TIME-OF-TRAVEL STUDIES OF THE U.S. GEOLOGICAL SURVEY,
Geological Survey, Reston, Va.
C. W. Boning.
Water-Resources Investigations 34-73, September 1973. 71 p, 3 tab, 19 ref.

Descriptors: *Flow rates, *Dye releases, *Travel time, *Indexing, *United States, Sites, Pollutants, Streamflow forecasting, Path of pollutants, Reach (streams), Hydraulics.

This index identifies locations on streams where the U.S. Geological Survey has investigated the time of travel of a highly soluble material moving through a reach of stream channel; it contains no basic data. It does contain a list of references to published data and analytical reports on time of travel and a list of U.S. Geological Survey offices where basic time-of-travel data are on file. The purpose of this index is to assist individuals and agencies locate time of solute travel data. Although a great deal of information is available, some is provided in a variety of publication series, and some is unpublished but available for inspection and use. Since the study sites and data sources are not well known, the compilation in this index should benefit future research and analytical efforts. The index is concerned only with studies conducted by the Geological Survey prior to May 1973. Many of the studies were done in cooperation with other federal and state agencies. The basic procedure in most measurements of the time of travel is to inject into the upstream end of a study reach a volume of radioactive or fluorescent dye tracer and then to monitor the passage of that tracer at one or more downstream sites. (Woodard-USGS)
W74-01874

COMPOUND WEIR STUDY, (IN CHINESE)
Taipei Hydraulic Research Lab., (Taiwan).
S. P. Mao.
Taipei Hydraulic Research Laboratory Research Bulletin, Series A: Hydraulic Model Studies, No 30, August 1972. (English summary) 16 p, 11 fig.

Descriptors: *Streamflow, *Runoff, *Discharge measurement, *Weirs, Flowmeters, Flow rates, Model studies, Correlation analysis, Analytical techniques, Floods, Low flow, Foreign countries.
Identifiers: *Taiwan, Compound weir, Rectangular weir, Triangular weir.

Measurement of runoff in Taiwan using the compound weiris described. The natural conditions of Taiwan include high mountains and rivers of great velocity, relatively high rainfall intensity, and plenty of annual rainfall, although uneven in distribution. Typhoons and rainstorms cause the runoff of drainage areas to increase rapidly; while in dry seasons streams in the valley almost stop running. Under such circumstances, runoff measurement cannot be made by using the ordinary rectangular or triangular weir. Only the compound weir meets the requirement of measuring the highest and lowest discharge. The compound weir has a rectangular shape in its upper part and triangular in lower part. During floodflow, the runoff can be measured by the rectangular part, and in the arid season, when the discharge of the stream is small, runoff can be measured by the lower triangular part of the compound weir. (Woodard-USGS)
W74-01875

OCEAN CURRENT MONITORING EMPLOYING A NEW SATELLITE SENSING TECHNIQUE,
National Environmental Satellite Service, Washington, D.C.
A. E. Strong, and R. J. DeRycke.
Science, Vol 182, No 4111, p 482-484, November 2, 1973. 2 fig, 10 ref.

Descriptors: *Waves (water), *Ocean currents, *Remote sensing, Ocean circulation, Ocean waves, Satellites (artificial).
Identifiers: *Gulf Stream.

The very-high-resolution radiometer on the NOAA-2 (National Oceanic and Atmospheric Administration) satellite obtained imagery in the visible channel containing sunglint over a major portion of the coastal waters off the eastern seaboard of the United States. An abrupt change in surface roughness was observed at the shoreward edge of the Gulf Stream Current from Florida to Cape Hatteras; it results from the opposition of waves propagating against the flow of the Gulf Stream. (Knapp-USGS)
W74-01876

ANADROMOUS FISH WATER REQUIREMENTS,
California State Dept. of Fish and Game, Sacramento.
For primary bibliographic entry see Field 08I.
W74-01880

ANNUAL COMPILATION AND ANALYSIS OF HYDROLOGIC DATA FOR NORTH CREEK, TRINITY RIVER BASIN, TEXAS, 1971,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 04D.
W74-01884

ANNUAL COMPILATION AND ANALYSIS OF HYDROLOGIC DATA FOR PIN OAK CREEK, TRINITY RIVER BASIN, TEXAS, 1971,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 04D.
W74-01889

INDEX OF STREAM GAGING STATIONS IN AND ADJACENT TO CALIFORNIA, 1970,
California State Dept. of Water Resources, Sacramento.
R. L. Chastain.
Bulletin No 157, June 1971. 151 p, 2 plate.

Descriptors: *Gaging stations, *Streamflow, *Flow measurement, *California, Networks, *Indexing, Stream gages, Sites, Drainage area, Equipment, Water quality, Publications, Computer programs, Data processing.

All known stream-gaging stations in California, past and present, and some tributary to California, are listed alphabetically by station name and numerically by Department of Water Resources number. Information is provided for nearly 4,500 stations. The information includes U.S. Geological Survey number, location, collecting agency, county, station class, drainage area, regulation and diversion, period of record, equipment, quality of record, and publication status. Also provided is a list of computer programs using streamflow data that are available in the Department of Water Resources. These station data are current as of July 1970. (Woodard-USGS)
W74-01943

FLOOD PLAIN INFORMATION, KENAI RIVER, PHASE I, KENAI PENINSULA BOROUGH, ALASKA.
Army Engineer District, Anchorage, Alaska.
For primary bibliographic entry see Field 04A.
W74-01952

BLACK HILLS FLOOD OF JUNE 9, 1972.
National Oceanic and Atmospheric Administration, Rockville, Md.

Natural Disaster Survey Report 72-1, August 1972. 20 p, 8 fig.

Descriptors: *Floods, *South Dakota, *Warning systems, *Flash floods, Flood forecasting, Data collections.
Identifiers: *Black Hills, *Rapid City (S Dak).

The morning after the disastrous flood of June 1972 swept through the canyons and valleys of the Black Hills of South Dakota, a survey team was dispatched to the devastated area to review the effectiveness of NOAA's warning service and to identify weaknesses that require remedy. In a few hours during the late afternoon and evening of June 9, 1972, a record rain fell on the Black Hills of South Dakota. A stationary group of thunderstorms over the Central Hills dumped as much as 15 inches of rain in some locations in less than 6 hours. The rains resulted in record-breaking floods on streams draining the eastern slopes of the Black Hills. Flash flood warnings issued by the National Weather Service Office (WSO) at Rapid City, S. Dak., were timely and useful. Prompt action by State, city, and county officials, and the Rapid City radio and TV stations undoubtedly saved a great number of lives. However, at the time of the flood there was no organized real-time reporting system for river flow and rainfall that was able to provide essential information. Action should be accelerated to determine the needs and to establish a river flow and rainfall reporting system suitable for use in the maintenance of the flash flood warning program. (Knapp-USGS)
W74-01953

PARAMETERS INFLUENCING MINIMUM STREAMFLOW,
Wyoming Univ., Laramie. Water Resources Research Inst.
T. A. Wesche, and P. A. Rechard.
In: Hydraulic Engineering and the Environment, Proceedings of the Hydraulic Division Specialty Conference, Bozeman, Montana, August 15-17, 1973. p 21-30, 1973. 3 tab, 10 ref. OWRR B-007-WYO (4). 14-31-0001-3668.

Descriptors: *Streamflow, Fish reproduction, Water quality, *Fish populations, *Trout, *Channel flow, Hydraulics.
Identifiers: *Average daily flow.

Basic to fish production are the quantity, quality and stability of the stream environment. When a water development project such as a dam or diversion is proposed on a stream, it is important to establish the amount of water required in the stream channel below the development to maintain the fish populations present. The tool and techniques currently available for making a minimum flow determination are not well developed. The factors upon which trout production depend are water quality, adequate food supply, spawning areas and shelter. The stream discharge, as influenced by the channel configuration, must meet the hydraulic requirements necessary to provide these factors. The determination of a suitable minimum flow is a difficult problem. The approach taken has centered on the following three types of physical stream characteristics and the changes observed in them between various levels of flow, based on the average daily flow (ADF) over the period of record: Hydraulic parameters; Surface area-water types; and Available trout cover. In the determination of a minimum flow for trout, these factors must be considered together, not separately. The results of this study have shown that for each physical parameter investigated, the greatest rate of decrease was observed for the discharge reduction from 25% to 12.5% ADF.
W74-02119

HYDROLOGIC REPORT LITTLE CALUMET RIVER AND TRIBUTARIES, PART I.
Horner and Shifrin, Inc., St. Louis, Mo.

Prepared for State of Indiana Department of Natural Resources, Division of Water, Indianapolis, Indiana, January 14, 1969. 99 p, 38 fig, 16 tab, 4 append.

Descriptors: Hydrology, *Hydrographs, *Synthesis, *Indiana, Streamflow, Streamflow forecasting, Surface runoff, Storms, Climatic data, Hydrologic data.
Identifiers: *Little Calumet River (Indiana).

The hydrology of the Little Calumet River and its tributaries was studied for the State of Indiana. The Little Calumet River is located in the northeastern part of the State. It has a total watershed of about 416 square miles and at one time flowed westward into Cook County, Illinois. However, the flow was reversed in 1926 by the construction of the Burns Ditch and Burns Waterway which provided an outlet to Lake Michigan. Five general aspects of hydrology were studied: (1) high river flows, studied by the synthetic hydrograph method using storm patterns transposed from other geographical areas, (2) minimum flows, (3) flood frequency, (4) flow duration, and (5) high water elevations of Lake Michigan. In Part II of the report of this study, the method used to develop the synthetic hydrographs is explained and a method developed by the Indiana Department of Natural Resources, using non-linear evaluations, is also used to develop hydrographs. Five large storms were studied in both methods, and the synthetic hydrographs were produced at 22 points along the River. Discussions and comparisons of the synthetic hydrographs are contained in a separate appendix to Part I. (Poertner)
W74-02127

ANNUAL COMPILATION AND ANALYSIS OF HYDROLOGIC DATA FOR COW BAYOU, BRAZOS RIVER BASIN, TEXAS, 1971,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 04D.
W74-02137

ANNUAL COMPILATION AND ANALYSIS OF HYDROLOGIC DATA FOR MUKEWATER CREEK, COLORADO RIVER BASIN TEXAS, 1971,
Geological Survey, Austin, Tes.
For primary bibliographic entry see Field 04D.
W74-02140

ON SMALL SCALE BREAKING WAVES,
Johns Hopkins Univ., Baltimore, Md. Chesapeake Bay Inst.
M. L. Banner, and O. M. Phillips.
Technical Report 82, (Reference 73-8), July 1973. 23 p, 8 fig, 6 ref. ONR N00014-67-A-0163-0009 NSF Grant GA-35390X.

Descriptors: *Waves (Water), Unsteady flow, Vortices, *Ocean waves, Turbulence, Winds, *Surf.
Identifiers: *Breakers (Waves), Wind drift.

The surface wind drift in the ocean substantially reduces the maximum wave height and wave orbital velocity that can be attained before breaking. Incipient breaking is characterized by the occurrence of stagnation points at wave crests, but not by discontinuities in slope. After breaking, there is in the mean flow a stagnation point relative to the wave profile near the crest of the broken wave, on one side of which the water tumbles forward and behind which it recedes more smoothly to the rear. Flow visualization studies indicate the general extent of the wake behind the breaking region; it is shown to be turbulent but momentumless. (Knapp-USGS)
W74-02144

2F. Groundwater

SUMMARY GROUND-WATER RESOURCES OF CLARION COUNTY, PENNSYLVANIA,
Geological Survey, Harrisburg, Pa. Water Resources Div.
For primary bibliographic entry see Field 04B.
W74-01721

FORAMINIFERS OF LAKE ISSYK-KULL AND GROUNDWATERS OF CENTRAL ASIA, (IN RUSSIAN),
Akademiya Nauk SSSR, Leningrad. Zoologicheskii Institut.
For primary bibliographic entry see Field 02H.
W74-01763

GEOLOGY OF MERCER AND OLIVER COUNTIES, NORTH DAKOTA,
Geological Survey, Grand Forks, N. Dak.
For primary bibliographic entry see Field 04B.
W74-01887

THE SUBSIDENCE OF THE SURFACE BETWEEN MOGOTES IN PURETO RICO EAST OF ARECIBO,
Technische Universitaet, Hanover (West Germany). Geographisches Institut.
F-D. Miotke.
Caves and Karst, Vol 15, No 1, p 1-12, January-February 1973. 11 fig, 20 ref.

Descriptors: *Karst hydololgy, *Geomorphology, *Weathering, *Pureto Rico, Tropical regions, Karst, Topography, Water chemistry, Carbonate rocks, Land subsidence, Subsurface drainage.
Identifiers: *Mogotes.

In a small area of mogotes and intervening depressions in northern Pureto Rico, solution of limestone is especially active at the foot of the steep slopes of the mogotes and beneath broad plains of blanket sands. The subsidence of the surface between the mogotes is the result of local collapse of cavities beneath the blanket sand, as well as the sheet solution. Chemical analyses of both surface- and underground water show that there is little significant difference in the process of solution of limestone in the Tropics and in temperate zones, even though the morphologic features are different. (Knapp-USGS)
W74-01912

BIBLIOGRAPHY AND INDEX OF OKLAHOMA GEOLOGY--1972,
Geological Survey, Norman, Okla.
E. A. Ham, and W. D.Rose.
Oklahoma Geology Notes, Vol 33, No 2, p 31-65, April 1973. 258 ref.

Descriptors: *Geology, *Bibliographies, *Documentation, *Oklahoma, Publications, Abstracts, Information retrieval, Petrology, Oil groundwater, Aquifers, Mineralogy, Stratigraphy, Reviews.

This bibliography, contains 258 documents pertaining to Oklahoma geology. References are listed alphabetically by author (or agency when no author is given). Also included is a subject indes. (Woodard-USGS)
W74-01916

THAT SINKING FEELING,
National Oceanic and Atmospheric Administration, Washington, D.C.
J. D. Bossler.
NOAA, Vol 3, No 4, p 52-53, October 1973. 1 fig, 1 photo.

Descriptors: *Land subsidence, *Withdrawal, Groundwater, Oil fields, Subsidence, Compaction, Water wells.

Land subsidence stems from two kinds of factors--those caused by nature, and those caused by man. Among the latter are the withdrawal of sand, water, oil, gas and other fluids. The amount of subsidence is dependent upon the the underlying geological sediments, and under some conditions may approximate as much as 25% of the amount of fluid withdrawn. In the Los Angeles and Long Beach harbor area, a maximum subsidence of about nine meters has been reported on Terminal Island. Another area of rapid subsidence is the Houston, Texas metropolitan area, where surveys have shown a maximum subsidence at one point of almost 2.5 meters in the past 30 years, including 1.2 meters in the last decade. One of the most highly publicized areas of subsidence is Venice, Italy, and the Po Delta, just south of the city. The land sinking in the Po Delta is attributed to the withdrawal of methane gas while the cause of the flooding in Venice is not well defined. In the Baton Rouge, La., area, subsidence has been estimated at close to that recorded in the Houston area. Most of the subsidence is attributed to the withdrawal of water for industrial and domestic purposes. Subsidence is also a problem in the San Joaquin and Imperial Valleys of California. (Knapp-USGS)
W74-01920

GEOLOGY OF BURKE COUNTY, NORTH DAKOTA,
Geological Survey, Grand Forks, N. Dak.
T. F. Freers.
North Dakota Geological Survey Bulletin 55 - Part I, and North Dakota State Water Commission County Groundwater Studies 14 - Part I, 1973. 32 p, 13 fig, 3 plate, 2 tab, 14 ref.

Descriptors: *Geological surveys, *Geologic mapping, *Geologic formations, *Hydrogeology, *North Dakota, Geologic investigations, Geomorphology, Aquifers, Topography, Sediments, Land forming, Aerial photography, Stratigraphy.
Identifiers: *Burke County (N. Dak).

This report is the first of a four-part series on the geology and groundwater resources of Burke and Mountrail Counties, North Dakota. Burke County is in northwestern North Dakota near the center of the Williston basin. It is underlain by sedimentary rocks of Paleozoic, Mesozoic, and Cenozoic age which range in thickness from about 9,400 to 11,700 feet, thickening southward and generally dipping gently to the south or southwest. The surficial deposits are glacial drift of Late Wisconsinan age except for scattered exposures of the Tertiary Sentinel Butte and Tongue River Formations in the northern part of the county and slough and spring deposits of the Coteau and Coteau escarpment areas. Surficial deposits consist chiefly of glacial till and outwash with some areas of postglacial sand, silt and clay. The county has been divided into four areas on the basis of topography: (1) the Central Lowlands which is an area of generally low relief, (2) the Missouri Escarpemtn which is a steep northward sloping band south of the Central Lowlands, (3) the Missouri Coteau which is an area of moderate to high relief and (4) the Coteau slope which is an area of low to moderate relief. (Woodard-USGS)
W74-01923

THEORETICAL ANALYSIS OF FORCED CONVECTIVE HEAT TRANSFER IN REGIONAL GROUND-WATER FLOW,
Illinois Univ., Urbana. Dept. of Geology.
P. A. Domenico, and V. V. Palciauskas.
Geological Society of America Bulletin, Vol 84, No 12, p 3803-3813, December 1973. 5 fig, 9 ref.

Descriptors: *Convection, *Groundwater movement, *Geothermal studies, Water circulation, Energy transfer, Heat transfer, Mass transfer, Hot springs, Thermal springs, Water temperature, Warm springs.

Anomalous temperature distributions in geologic basins may be caused by the spatial redistribution of heat by moving groundwater. This problem is examined by solving the energy equation for the simultaneous transport of water by hydraulic gradients and heat by forced convection. The severity of an anomalous geothermal gradient or temperature measurement depends primarily on the relative magnitude of the ratio of hydraulic conducitivity to thermal diffusivity, and on the geometry of the flow field. A dimensionless group may be formulated from these parameters, and provides a relative measure of the simultaneous transport of heat by the bulk motion of the fluid to that by pure conduction. Solutions to the equation indicate that convective heat losses in groundwater recharge areas are balanced by convective heat gains in discharge areas. The geothermal gradient accordingly increases with increasing depth in recharge areas, decreases with increasing depth in discharge areas, and is a manifestation of pure conduction at the hinge line separating areas of recharge and discharge. (Knapp-USGS)
W74-01957

GEOLOGIC FACTORS AFFECTING COMPACTION OF DEPOSITS IN A LAND-SUBSIDENCE AREA,
Arizona Univ., Tucson. Dept. of Geosciences.
For primary bibliographic entry see Field 04B.
W74-01958

GROUNDWATER DISCHARGE INTO SEAS (O RAZGRUZKE PODZEMNYKH VOD V MORYA),
Akademiya Nauk SSSR, Moscow, Institut Vodnykh Problem.
I. S. Zektser, V. A. Ivanov, and A. V. Meskheteli.
Vodnyye Resursy, No 3, p 125-146, 1972. 2 fig, 133 ref.

Descriptors: *Base flow, *Groundwater, *Sea water, *Oceans, *Submarine springs, Hydrologic cycle, Water balance, Salt balance, Hydrodynamics, Hydrology, Hydrogeology, Marine geology, Oceanography, Sedimentology, Geomorphology, Geophysics, Geothermal studies, Geochemistry, Water chemistry, Model studies.
Identifiers: USSR, Dye-tracer studies.

The problems of groundwater discharge into seas and oceans include: (1) a study of the role of subsurface discharge into seas in the world water balance and global hydrological cycle; (2) an estimate of groundwater effects on formation of water and salt balances of seas and large lakes; (3) a study of seawater and groundwater relations in littoral regions; (4) a study of groundwater discharge as it affects formation of mineral resources at the ocean bottom; and (5) a study of areas of fresh groundwater discharge in littoral zones of seas for water supply. Techniques of investigations of groundwater discharge into seas and oceans include: (1) methods based on a study of the watershed area bordering a sea; and (2) methods based on a study of the water body. The first group includes the hydrodynamic method, the method of average long-term water balance, the hydrologic-hydrogeological method, and the method of simulation. The second group includes methods based on a study of seawater (measurement of its electrical conductivity, study of its temperature distribution and chemical composition, and dye-tracer studies of groundwater discharge); and methods based on a study of the sea bottom (investigation of groundwater discharge from physical or chemical anomalies in bottom sediments--the geothermal and geochemical methods; and a study of geostructural conditions of the sea bottom--the geophysical method; marine geomorphological investigations; and observations using shallow-water diving techniques and bathyscaphes). The clearest manifestation of groundwater discharge into seas is the discharge of submarine springs. (Josefson-USGS)
W74-01962

FRESH GROUNDWATER YIELD IN THE USSR AND PROSPECTS FOR ITS USE (OB EKSPLUATATSIONNYKH RESURSAKH PRESNYKH PODZEMNYKH VOD SSSR I PERSPEKTIVAKH IKH ISPOL'ZOVANIYA),
For primary bibliographic entry see Field 04B.
W74-01965

GROUND-WATER RESOURCES OF KLEBERG, KENEDY, AND SOUTHERN JIM WELLS COUNTIES, TEXAS,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 04B.
W74-02138

GROUNDWATER RESOURCES OF BLANCO COUNTY, TEXAS,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 04B.
W74-02141

GEOLOGY OF MOUNTRAIL COUNTY, NORTH DAKOTA,
Geological Survey, Grand Forks, N. Dak.
L. Clayton.
North Dakota Geological Survey Bulletin 55 - Part IV, and North Dakota State Water Commission County Groundwater Study 14 - Part IV, 1972. 70 p, 9 fig, 2 map, 1 tab, 27 ref.

Descriptors: Hydrogeology, *Geological surveys, *Geologic mapping, *Groundwater resources, *North Dakota, Water pollution sources, Geologic investigations, Geologic formations, Geomorphology, Topography, Sediments, Erosion, Sedimentation, Lakes, Ponds, Water quality, Stratigraphy, Geologic history.
Identifiers: *Mountrail County (N Dak).

This is volume IV of a four-volume report on the geology and groundwater resources of Burke and Mountrail Counties, N. Dak. This volume is divided into two sections. Section A is a description of the topography, the rock and sediment, and the general hydrology of Mountrail County. In addition, section A contains a brief summary of the age and origin of the topography, rock, and sediment of the county. Section A is written for those (especially nongeologists) who are interested in the physical nature of the near-surface earth materials underlying the county. Section B is a more detailed discussion of the problems involved in determining the age and origin of the geologic materials and landforms in Mountrail County. This section is written for those (especially geologists) who are interested in the geologic processes and sequence of events during late Cenozoic time in this area. Contractors and civil engineers interested in the gross characteristics of foundation materials at potential construction sites can determine the kinds of materials to be expected from a map inciuded. General information concerning groundwater pollution also is presented. (Woodard-USGS)
W74-02145

2G. Water in Soils

RELATIVE LEACHING RATES OF COMMON NITROGEN CARRIERS FROM SANDY SOILS IN RELATION TO LAKE EUTROPHICATION,
Roliins Coll., Winter Park, Fla. Dept. of Biology.
For primary bibliographic entry see Field 05B.
W74-01654

INTERPRETATION OF ERTS-MSS IMAGES OF A SAVANNA AREA IN EASTERN COLOMBIA.
Centro Interamericano de Fotointerpretacion, Bogota (Colombia).
G. W. W. Elbersen.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 105-119, 1973. 4 fig, 6 ref.

Descriptors: *Remote sensing, *Satellites (Artificial), *Mapping, *Soil surveys, *South America, Soil types, Data collections, Forests, Land management.
Identifiers: ERTS, *Colombia.

ERTS imagery was used for extrapolation of existing soil maps into unmapped areas of the Llanos Orientales of Colombia. Most units delineated in the existing reconnaissance soil map at a scale of 1:250000 could be recognized and delineated in the ERTS image. In those cases where delineations were unsatisfactory it is to be expected that repeated ERTS coverage could improve the results. The resulting map shows sufficient detail to justify a publication scale of 1:500.000. It can be classified as a soil map between the exploratory and schematic types. With repeated ERTS coverage and some field work it may be improved to between the exploratory and reconnaissance types. These maps are useful in the first stages of planning in remote undeveloped areas. The application of conventional photointerpretation techniques (physiographic analysis) on ERTS imagery can yield significant practical results especially in the developing countries. (See also W74-01663) (Knapp-USGS)
W74-01677

DELINEATION OF MAJOR SOIL ASSOCIATIONS USING ERTS-1 IMAGERY,
Tennessee Univ., Knoxville. Dept. of Soil Science.
W. L. Parks, and R. E. Bodenheimer.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 121-125, 1973. 3 fig.

Descriptors: *Remote sensing, *Satellites (Artificial), *Mapping, *Soil surveys, Tennessee, Soil types, Data collections, Soil moisture, Land use, Surveys.
Identifiers: ERTS.

A major soil association in the loess region of Obion County was delineated using ERTS-1 imagery. Channel 7 provides the clearest differentiation. Separation of other smaller soil associations in an intensive row crop agricultural area is somewhat more difficult. Soil differentiation was accomplished visually as well as with a scanning microdensitometer. Lower altitude aircraft imagery permits a more refined soil association identification and where imagery is of sufficient scale, even individual soils may be identified. (See also W74-01663) (Knapp-USGS)
W74-01678

SEPTIC SYSTEMS: EFFECTS OF SURFACE AND SUBSURFACE WATER,
Lake County Health Dept., Waukegan, Ill.
For primary bibliographic entry see Field 05B.
W74-01716

WATER MANAGEMENT USING SUBSURFACE DRAINS,
North Carolina State Univ., Raleigh. Dept. of Biological and Agricultural Engineering.
For primary bibliographic entry see Field 03F.
W74-01717

REDUCING SEEPAGE FROM STOCK TANKS WITH UNCOMPACTED, SODIUM-TREATED SOILS,
Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
For primary bibliographic entry see Field 04A.
W74-01718

SOIL PROPERTIES IN RELATION TO THE GROWTH AND YIELD OF OIL PALM (ELAEIS GUINEENSIS JACQ.) IN SURINAM,
Landbouwproefstation, Paramaribo (Surinam).
F. W. Van Amson.
Landbouwproefstn Suriname Bull. 89. p 4-103, 1972, Illus.
Identifiers: Drought, Elaeis-guineensis, Growth, Nitrogen, *Oil palm, Pueraria-javanica, *Soil properties, *Surinam, Yield, *Soil-water-plant relationships.

Morphological, chemical and physical soil data were collected, to obtain information about growth and yield of the palm in relation to soil properties. Root studies and foliar analysis were included. Fifteen year old palms were observed, growing on a hydromorphic sequence of very fine loamy sand in the Old Coastal Plain. Oil palms about 7 yr of age, cultivated on the hill soils of the interior also were studied. With exception of the palms planted on the heavy clay soils of the Young Coastal Plain those on a very poorly drained silty soil of the Old Coastal Plain, oil palms grew and yielded well under a variety of soil conditions. Extreme drought will cause a retarded growth on a medium drained loamy sand. Podzolic loamy sand with a water table of plus or minus 30 cm below the surface during the rainy season, will profit in extremely dry years from the relatively higher moisture content in the subsoil. The best yield was obtained from a medium to poorly drained loamy sand. Soils which are not influenced by the water table and with a sandy loam to clay loam texture form a favorable root and growth medium. High yield is mainly related to a high number of bunches. Horizons with a large amount of gravel or iron concretions form only a temporary obstacle for root penetration. Under normal rainfall conditions, 7 yr old palms growing on soils with a hardpan, have still been capable of satisfactory production. Drought is more harmful than periods of heavy rainfall. The results of the foliar analysis were not conclusive, but N seems to be limiting. This is caused by small N applications as a consequence of an over-estimation of the N supplying potentials of kudzu (Pueraria javanica).--Copyright 1973, Biological Abstracts, Inc.
W74-01736

CONCEPTS IN VEGETATION/SOIL SYSTEM DYNAMICS: POST STEADY-STATE,
Australian National Univ., Canberra. Dept. of Forestry.
For primary bibliographic entry see Field 02I.
W74-01739

INFILTRATION AND LEACHING OF A LOCATED TRACTER IN AN UNSATURATED SOIL: EFFECT OF INITIAL MOISTURE CONTENT, (IN FRENCH),
Institut National de la Recherche Agronomique, Dijon (France). Station d'Amerioration des Plantes.
Y. Clouet, A. Feodoroff, A. Libois, and Suzanne, Meriaus.
Ann Agron (Paris). Vol 23, No 4, p 461-468, 1972. Illus. (English summary).
Identifiers: Displacement, *Infiltration, *Leaching, Moisture, Porosity, Salt, Soils, Tracer, *Unsaturated soil.

The infiltration velocity of a non-saturating rainfall is higher with the higher initial content. This may be due to considerable porosity. Displacement of a located soluble salt into the soil is directly affected by the depth of infiltration. In the soil tested, the displacement of the salt, for the same water supply, was greater with the higher initial moisture content.--Copyright 1973, Biological Abstracts, Inc.
W74-01752

WATER-SALT BALANCE OF SALINE SOILS UNDER IRRIGATION AT THE FOOTHILL PLAINS OF GOLODNAYA STEPPE, (IN RUSSIAN).
Moscow State Univ. (USSR). Dept. of Pedology.

Vestn Mosk Univ Ser 6 Biol Pochvoved. Vol 27, No 3, p 83-92, 1972. Illus. (English summary).
Identifiers: Drainage, Foothills, Irrigation, Leaching, Plains, *Saline soils, Salts, Soils, *USSR (Golodnaya Steppe), *Water-salt balance.

The effectiveness of different drainage types in the soil desalinization process were compared. The optimal conditions of drainage were determined to achieve the total effect of leaching on saline soils.--Copyright 1973, Biological Abstracts, Inc.
W74-01753

EFFECT OF IRRIGATION AND ALKALI TREATMENT ON THE MICROBIOLOGICAL PROCESSES IN SOIL, (IN UKRAINIAN),
Khersonskii Selskokhozyaistvennyi Institut (USSR).
For primary bibliographic entry see Field 03F.
W74-01761

SPECTROPHOTOMETRIC DETERMINATION OF SOIL WATER CONTENT,
S. A. Bowers, and S. J. Smith.
Soil Sci Soc Am Proc. Vol 36, No 6, p 978-980, 1972. Illus.
Identifiers: *Soil water, *Spectrophotometry, *Absorbance.

The absorbance at 1.9 micro by a soil-methanol extract was used for measuring the soil water contents of 3 different textured soils. A linear relation between absorbance and soil water content was adequate for moisture determinations ranging from air dry to the moisture equivalent. For Quincy loamy sand and Barnes loam soils, calibration based only on laboratory standards was sufficient. For Houston Black clay, calibration against oven-dry samples was necessary. Determination time was approximately 1 hr.--Copyright 1973, Biological Abstracts, Inc.
W74-01770

NITRATE IN UNSATURATED ZONE OF AN ALLUVIAL SOIL IN RELATION TO FERTILIZER NITROGEN RATE AND IRRIGATION LEVEL,
Michigan State Univ., East Lansing. Dept. of Crop and Soil Sciences.
D. C. Adriano, P. F. Pratt, and F. H. Takatori.
J Environ Qual. Vol 1, No 4, p 418-422. 1972, Illus.
Identifiers: *Alluvial soils, Apium-Graveolens, Asparagus-Officinalis, Denitrification, Drainage, *Fertilizers, Irrigation, *Nitrates, Nitrogen, *Soil (Unsaturated zone), Celery, Asparagus.

Soil samples to the 15-m depth beneath asparagus (Asparagus officinalis L.) and celery (Apium graveolens L.) were taken to determine the NO3-concentration in the solution of the unsaturated zone and to estimate the soil N balance. Transit time for water to move to the 15-m depth was calculated from drainage volumes and volumetric water contents. N balance was calculated from data for N input, N removal in harvested crops, and water records for the calculating of transit time. The NO3-concentration in the unsaturated zone increased with increase in N rate but was inversely related to the leaching volume. Denitrification was assumed to be the cause of high N losses with high irrigation levels. However, the rather high loss of 67.7% in the celery experiment, which received large amounts of chicken manure, was assumed to be a result of both net immobilization and denitrification. A combination of high losses of N, which ranged 18.3-67.7%, and large amounts of excess N, in the NO3-form in the soil could have been 1 cause of the low efficiency of recycling N by these crops. High rates of N combined with high levels of water use are apparently conducive to denitrification in relatively permeable soils.--Copyright 1973, Biological Abstracts, Inc.
W74-01774

ENTRY OF CHEMICAL ELEMENTS--ANALOGUES (STRONTIUM-90-CALCIUM AND CESIUM-137-POTASSIUM) INTO PLANTS IN RELATION TO SOIL MOISTURE, (IN RUSSIAN),
For primary bibliographic entry see Field 02I.
W74-01783

SEWAGE FARMING,
Washington Univ., St. Louis, Mo., Center for the Biology of Natural Systems.
For primary bibliographic entry see Field 05D.
W74-01863

AVAILABILITY OF PHOSPHORUS AND NITROGEN IN ACID SOIL IN PRESENCE OF CALCIUM SALTS,
Allahabad Univ. (India). Dept. of Chemistry.
S. Ali, S. K. De, and S. Chandra.
U A R J Soil Sci. Vol 11, No 2, p 233-243. 1971.
Identifiers: *Acidic soils, *Calcium salts, *Nitrogen, *Phosphorus, Salts, *Soil chemical properties.

Additions of 9 calcium salts -CaCO3, di-calcium phosphate, calcium oxide, calcium sulfate, calcium sulfide, calcium sulfite, calcium nitrate, calcium acetate and calcium citrate increased the availability of soil N and P under different moisture conditions. In highly acidic soil the application of CaCO3 gave the maximum availability of soil P and N; the addition of calcium acetate gave maximum availability of soil P and N in slightly acidic soil. A greater time of reaction (2 mo.) and increase in the resultant pH values by the addition of calcium salts increased the availability of soil P and N.--Copyright 1973, Biological Abstracts, Inc.
W74-01896

PRESSURE-INDUCED CHANGES IN THE THERMAL AND ELECTRICAL PROPERTIES OF CLAY-WATER SYSTEMS,
Guelph Univ. (Ontario). Dept. of Soil Science.
B. D. Kay, and P. F. Low.
J Colloid Interface Sci. Vol 40, No 3, p 337-343. 1972. Illus.
Identifiers: *Clay-water systems, *Electrical properties, *Electrical properties, Pressure, *Thermal properties, *Sodium-saturated clays.

Na-saturated clays were prepared from Wyoming bentonite by 3 different methods which allowed progressively greater contamination with hydrous Al2O3. Water or dilute NaCl was added to them to form clay-water mixtures having different clay contents. The heat of compression of each mixture was determined at several pressures in a Calvet micro-calorimeter. The emf (electromotive force) between reversible electrodes in and the electrical resistance of each mixture were also determined at several pressures. When plots were made of the heat of compression, change in emf and change in electrical resistance against pressure, breaks were observed in the curves for the Na/Al-clay at concentrations greater than 3.0% by volume in the pressure range 20-30 psi. Similar breaks were not detected in the curves for the other clays. The water in the Na/Al-clay mixtures underwent a pressure-induced phase transition in the specified pressure range. Sensitive differential thermal analyses revealed that a phase transition was not induced in this water by raising its temperature to 70C.--Copyright 1973, Biological Abstracts, Inc.
W74-01903

INTERNATIONAL SYMPOSIUM ON HYDROLOGY OF WATERLOGGED AREAS (MEZHDUNARODNYY SIMPOZIUM PO GIDROLOGII ZABOLOCHENNYKH TERRITORIY),
I. Ye. Kuksin.
Vodnyye Resursy, No 3, p 208-210, 1972.

Descriptors: *Conferences, *Hydrology, *Saturated soils, Bogs, Peat, Temperate, Water balance, Land reclamation, Drainage, *Drainage systems, Drainage effects, Investigations, Forecasting.
Identifiers: USSR (Belorussia).

An international symposium on hydrology of waterlogged areas was held in Minsk, July 17-21, 1972. The symposium was conducted in accordance with the program of the International Hydrological Decade and was organized by UNESCO in collaboration with the Belorussian Republic and sponsored by the International Association of Hydrological Sciences. Conference participants numbered over 100 scientists and specialits from Hungary, the German Democratic Republic, Ireland, the Netherlands, Norway, Poland, Rumania, the USSR, the United States, Finland, and the German Federal Republic. Reports of the conference were classified into 3 categories: (1) methods and results of hydrological, climatic, geological, and soil-botanical investigations of waterlogged areas of the temperate zone; (2) methods and results of water-balance computations, and their use in designing drainage systems in the temperate zone; and (3) transformation of the water regimen of waterlogged areas of the temperate zone by modern reclamation practices, and a forecast of its effect on the meteorological regime of the environment. The proceedings of the symposium will be published. (Josefson-USGS)
W74-01963

OPTIMUM CONTROL OF IRRIGATION WATER APPLICATION,
Arizona Univ., Tucson. Dept. of Watershed Management.
For primary bibliographic entry see Field 03F.
W74-01973

A NEW ELECTRICAL SOIL-MOISTURE MEASURING UNIT,
Michigan State Univ., East Lansing. Dept. of Soil Science.
G. Bouyoucos.
Soil Sci. Vol 114, No 6, p 493. 1972. Illus.
Identifiers: *Electrical equipment, *Soil moisture, *Measurement.

The newly perfected nylon moisture block measures soil moisture satisfactorily. It gives readings from 20 ohms at near saturation to 3,000,000 ohms at the air-dry state. It measures the moisture content of coils from slightly above fluid capacity to conditions approximating the air-dry state. A description of this nylon block is given. This new apparatus is not intended to replace the original plaster of paris block.--Copyright 1973, Biological Abstracts, Inc.
W74-01978

PLANT-AVAILABLE AND EXTRACTABLE SULFUR IN SOME SOILS OF ENGLAND AND WALES,
Grassland Research Inst., Hurley (England). Soils Plant Nutrition Div.
L. H. P. Jones, D. W. Cowling, and D. R. Lockyer.
Soil Sci. Vol 114, No 2, p 104-114. 1972. Illus.
Identifiers: England, Fertilizers, Grass, Nutrition, Perennial, Rye, *Soils, *Sulfur, *United Kingdom, Wales.

Investigations by soil chemical and pot-culture procedures of the S status of 16 soils of England and Wales are described. The S supplying power of the soils, i.e., available S, was assessed by measuring the total uptake by perennial ryegrass in pots in a growth chamber with the air filtered to exclude gaseous S compounds. Total uptake comprised the S in 4 successive harvests of tops plus that in the roots after the 4th harvest. The available S was generally greater in soils of the wet region than in those of the dry region and was highly correlated with the amounts of soluble plus adsorbed sulfate originally present in the soils and extractable with potassium phosphate solution. The decreases in this fraction during the growth period accounted for 80-94% of the available S, and release through mineralization contributed the remainder. The higher levels of available S in the soils of the wet region were due mainly to their greater retention of sulfate by adsorption rather than to any difference in previous S inputs through rainfall and fertilizers; the combined average of these inputs is estimated to be about the same for the 2 regions. The pot-culture experiment included a treatment with added sulfate S and the yield of dry matter at each of the harvests was used as the basis for calculating the reduction in yield due to S deficiency. Significant reductions of more than 10% were generally associated with S contents in the tops of 0.17% or less. The ratios of total N to total S in the tops ranged 8-80, and were generally less than 15 until yields were reduced by S deficiency.--Copyright 1973, Biological Abstracts, Inc.
W74-01997

MOBILITY OF ELEMENTS IN SOIL PROFILES OF MONT ST. HILAIRE, QUEBEC, CANADA, UNDER VARYING SLOPES AND DRAINAGE CONDITIONS,
Karachi Univ. (Pakistan). Dept. of Geology.
K. A. Mallick.
Nucleus (Karachi). Vol 9, No 1/2, p 85-96. 1972. Illus.
Identifiers: Calcium, *Canada (Mont St. Hilaire, Que.), *Drainage, Mobility, *Slopes, *Soil profiles, Zinc.

The soils are developed from underlying rocks, with some exceptions in the contact zones. The effect of drainage conditions on the enrichment and depletion of the relatively mobile elements in the soil profiles of Mont St. Hilaire is very pronounced. In conditions of poor drainage the concentration of Zn, Fe, Mn and Ca in the A-horizon is higher or equal to that in the B-horizon of soil profiles and the reverse is true in well drained conditions. In the poorly drained areas, the weight percentage of the fine fraction is nearly equal to or more than the coarse grained fraction of the sample. The relatively higher weight percentage of the fine fraction in the poorly drained areas is not affected appreciably by changes in the slope. In general the weight percentage of the finer fraction is much greater in essexite, igneous breccia and hornfels than in syenitic rocks, probably because of comparatively rapid disintegration and decomposition of mafic minerals. Some of the samples from the igneous breccia area show wide variation in the enrichment and depletion of Ca and Zn--Copyright 1973, Biological Abstracts, Inc.
W74-02007

SOME CHARACTERISTICS OF SOIL AND PERENNIAL VEGETATION IN NORTHERN MOJAVE DESERT AREAS OF THE NEVADA TEST SITE,
California Univ., Los Angeles. Lab. of Nuclear Medicine and Radiation Biology.
For primary bibliographic entry see Field 05B.
W74-02024

CONTRIBUTION TO THE STUDY OF THE MIGRATION OF RUTHENIUM-106 IN SOILS,
Commissariat a l'Energie Atomique, Cadarache (France). Centre d'Etudes Nucleaires.
For primary bibliographic entry see Field 05B.
W74-02051

DISTRIBUTION OF RA-226 IN SOIL AND WATER,
Bahaba Atomic Research Centre, Bombay (India). Health Physics Div.
For primary bibliographic entry see Field 05B.
W74-02057

THERMODYNAMICS OF SWELLING CLAY--WATER SYSTEMS,
Sonoma State Coll., Rohnert Part, Calif.
G. Sposito.
Soil Sci. Vol 114, No 4, p 243-249. 1972, Illus.
Identifiers: *Clay-water system, *Swelling, Thermodynamics, *Soils.

The swelling of clay-water systems can be accounted for directly in macroscopic terms. Predictions of the volume change upon swelling and the swelling pressure are possible, when non-equilibrium effects are small, in terms of unambiguous, macroscopic parameters alone. That "geometry factor" is not relevant to a purely macroscopic description of these materials is discussed.--Copyright 1973, Biological Abstracts, Inc.
W74-02071

THE RELATION BETWEEN MOISTURE MEASUREMENTS WITH A NEUTRON PROBE AND SOIL TEXTURE,
Hebrew Univ., Jerusalem (Israel).
B. Gornat, and D. Goldberg.

Soil Sci. Vol 114, No 4, p 254-258. 1972, Illus.
Identifiers: Measurements, *Moisture measurement, *Neutron probe, *Soil texture, Soil-water relationships.

The permissible depth to which a neutron probe may be lowered between 2 consecutive soil moisture determinations without losing accuracy is influenced by soil texture. In situ measurements made in a sandy soil using increments 15, 30, 45 or 60 cm thick, gave the same average soil moisture content for the entire profile. In a fine-textured soil, sampling by 30-cm increments produced a deviation double that obtained in sand using 60-cm increments.--Copyright 1973, Biological Abstracts, Inc.
W74-02074

LAND MANAGEMENT IN RED (CHALKA) SOILS OF TELENGANA,
Indian Council of Agricultural Research, Hyderabad. Southern Regional Soil Conservation Research Centre.
For primary bibliographic entry see Field 03F.
W74-02086

NITROGEN TRANSFORMATIONS DURING SUBSURFACE DISPOSAL OF SEPTIC TANK EFFLUENTS IN SANDS: 1. SOIL TRANSFORMATIONS,
Wisconsin Univ., Madison. Dept. of Soil Science.
For primary bibliographic entry see Field 05B.
W74-02147

NITROGEN TRANSFORMATIONS DURING SUBSURFACE DISPOSAL OF SEPTIC TANK EFFLUENT IN SANDS: II. GROUND WATER QUALITY,
Wisconsin Univ., Madison. Dept. of Soil Science.
For primary bibliographic entry see Field 05B.
W74-02148

MOVEMENT OF TOXAPHENE AND FLUOMETURON THROUGH DUNBAR SOIL TO UNDERLYING GROUND WATER,
Clemson Univ., S.C.
For primary bibliographic entry see Field 05B.
W74-02149

NITRATE IN SURFACE AND SUBSURFACE FLOW FROM A SMALL AGRICULTURAL WATERSHED,
Agricultural Research Service, Watkinsville, Ga.
For primary bibliographic entry see Field 05B.
W74-02150

2H. Lakes

EFFECT OF BENTHIC SEDIMENTS ON THE OXYGEN CYCLE IN PONDS, (IN RUSSIAN),
Akademiya Nauk Uzbekskoi SSR, Tashkent. Institut Zoologii i Parazitologii.
V. S. Polishchuk.
Uzb Biol Zh. Vol 16, No 3, p 48-50, 1972, Illus.
Identifiers: *Benthic sediments, *Oxygen absorption (Benthos), Ponds, Sediments, Absorption.

The oxygen absorption by benthic buildup in ponds was a function of both the layer thickness and the season. The rate of oxygen absorption is highest during the June-Aug. period when the water temperature is high. Muddy bottoms absorb oxygen more readily than sandy ones.--Copyright 1973, Biological Abstracts, Inc.
W74-01660

RADAR INVESTIGATION OF SUMMERTIME LAND/LAKE RAINFALL VARIATIONS OVER LAKE MICHIGAN,
Wisconsin Univ., Milwaukee. Dept. of Geography.
For primary bibliographic entry see Field 02B.
W74-01661

ORGANIC MATTER AND ELEMENTS IN THE HYDROLOGIC REGIMEN OF VOLGA RESERVOIRS (ORGANICHESKOYE VESHCHESTVO I ELEMENTY GIDROLOGICHESKOGO REZHIMA VOLZHSKIKH VODOKHRANILISHCH).
Akademiya Nauk SSSR, Moscow. Institut Biologii Vnutrennkh Vod.
For primary bibliographic entry see Field 05B.
W74-01723

ORGANIC MATTER IN WATER OF LAKE ONEGA AND SOME WATER BODIES OF THE VOLGA-BALTIC WATERWAY IN THE SUMMER OF 1968 (ORGANICHESKOYE VESHCHESTVO V VODE ONEZHSKOGO OZERA I NEKOTORYKH VODOYEMOV VOLGO-BALTIYSKOGO VODNOGE PUTI LETOM 1968 G.),
Akademiya Nauk SSSR, Moscow. Institut Biologii Vnutrennkh Vod.
For primary bibliographic entry see Field 05B.
W74-01725

CONTENT AND DISTRIBUTION OF NITROGEN COMPOUNDS IN THE RYBINSK RESERVOIR IN SUMMER AND AUTUMN (SODERZHANIYE I RASPREDELENIYE SOYEDINENIY AZOTA V RYBINSKOM VODOKHRANILISHCHE V LETNE-OSENNIY PERIOD),
Akademiya Nauk SSSR, Moscow. Institut Biologii Vnutrennkh Vod.
For primary bibliographic entry see Field 05B.
W74-01726

SOME FEATURES OF THE HYDROLOGIC REGIMEN OF SARATOV RESERVOIR (NEKOTORYYE CHERTY GIDROLOGICHESKOGO REZHIMA SARATOVSKOGO VODOKHRANILISHCHA),
Akademiya Nauk SSSR, Moscow. Institut Biologii Vnutrennykh Vod.
For primary bibliographic entry see Field 04A.
W74-01728

BAROCLINIC BOUNDARY CURRENTS AND LONG EDGE-WAVES IN BASINS WITH SLOPING SHORES,
Waterloo Univ. (Ontario). Dept. of Mechanical Engineering.
G. T. Csanady.
Journal of Physical Oceanography, Vol 1, No 2, p 92-104, April 1971. 9 fig, 13 ref, 3 append.

Descriptors: Coasts, Shallow water, *Shores, Beaches, Thermocline, *Boundary processes, *Waves (Water), *Great Lakes.
Identifiers: *Edge-waves, Near shore processes, Kelvin waves, *Baroclinic motions, Boundary currents.

Earlier work on baroclinic 'coastal jets' and Kelvin waves in constant-depth basins is extended to basins with sloping shores. Baroclinic coastal jets are again found to be set up by an inflow or outflow of water to or from the shore zone, but the center of these is now somewhat displaced from shore (under typical Great Lakes conditions by a distance of order 10 km). Shore-bound waves (edge-waves) of long wavelength are found to be possible only at frequencies below the inertial and are associated with quasi-geostrophic flow. Moreover, these waves propagate in the same sense as Kelvin waves. However, an infinite sequence of such edge-waves appear, replacing the simple Kelvin waves of the constant-depth model (of given wave-length). The frequency of all of these is well below the Kelvin wave frequency in a constant depth basin. The structure of the basic mode is very similar to that in a constant-depth basin, but that of the higher modes becomes progressively more complex, containing bands of opposing currents. (Sinha-OEIS)
W74-01733

WEIGHT, SIZE, AND CHEMICAL COMPOSITION OF SOME FRESHWATER ZOOPLANKTERS: DAPHNIA HYALINA (LEYDIG),
European Atomic Energy Community, Ispra (Italy). Biology Div.
M. F. Baudouin, and O. Ravera.
Limnol Oceanogr, Vol 17, No 4, p 645-649, 1972, Illus.
Identifiers: Chemical composition, Daphnia-hyalina, *Italy (Lago Monate), Plankters, Size, Weight, *Zooplankton, Minerals.

Size, dry weight, ash, and concentration of C, H, N, P, and Ca of D. hyalina from Lago Monate (northern Italy) were investigated. The concentration of the elements varies with age of the individuals. Eggs have the maximum concentration of C and H, the newborn of P, and the young of N. No seasonal variation was observed for individuals of the same size.--Copyright 1973, Biological Abstracts, Inc.
W74-01745

DYNAMIC STATUS OF PRIMARY PRODUCTION IN LAKE YUNOKO, A SMALL EUTROPHIC SUBALPINE LAKE IN CENTRAL JAPAN,
Tokyo Univ. (Japan). Botanical Inst.
For primary bibliographic entry see Field 05C.
W74-01750

PHYTOPLANKTON OF THE UPPER YENISEI BEFORE THE SAYANY RESERVOIR FORMATION, (IN RUSSIAN),
Akademiya Nauk SSSR, Leningrad. Institut Ozerovedeniya.
For primary bibliographic entry see Field 05C.
W74-01757

MICROPHYTOBENTHOS AND OVERGROWING SOME RESERVOIRS IN TURKMENIA, (IN RUSSIAN),
Akademiya Nauk Turkmenskoi SSR, Askhabad. Institut Botaniki.
For primary bibliographic entry see Field 05C.
W74-01758

FORAMINIFERS OF LAKE ISSYK-KULL AND GROUNDWATERS OF CENTRAL ASIA, (IN RUSSIAN),
Akademiya Nauk SSSR, Leningrad. Zoologicheskii Institut.
A. I. Yankovskaya, and V. I. Mikhalevich.
Dokl Akad Nauk SSSR Ser Biol. Vol 205, No 4, p 1005-1008, 1972. Illus.
Identifiers: Asia, Bristeniolla-Macrostoma, Elphidiella-Brotzkajae, *Foraminifers, *Groundwater, Jadammina-Zernovi, Lakes, *USSR (Lake Issyk-Kull).

Descriptions are given of specimens of Bristeniolla macrostoma, Jadammina zernovi and Elphidiella brotzkajae collected from Lake Issyk-Kul (USSR) and groundwaters of Central Asia.--Copyright 1973, Biological Abstracts, Inc.
W74-01763

EFFECT OF CERTAIN PHYSIOCOCHEMICAL FACTORS ON THE PLANKTON OF THE NANGAL LAKE,
Punjab Univ., Chandigarh (India). Dept. of Zoology.
For primary bibliographic entry see Field 05C.
W74-01778

NUTRIENTS IN NATURAL WATERS.
For primary bibliographic entry see Field 05C.
W74-01798

CHANGES IN C, N, P, AND S IN THE LAST 140 YEARS IN THREE CORES FROM LAKES ONTARIO, ERIE, AND HURON,
Department of the Environment, Burlington (Ontario). Centre for Inland Waters.
For primary bibliographic entry see Field 05C.
W74-01805

EFFECTS OF SEDIMENT DIAGENESIS AND REGENERATION OF PHOSPHORUS WITH SPECIAL REFERENCE TO LAKES ERIE AND ONTARIO,
Department of the Environment, Burlington (Ontario). Centre for Inland Waters.
For primary bibliographic entry see Field 05C.
W74-01806

A LIMNOLOGICAL SURVEY OF THE FRESHWATER COASTAL LAKES OF EAST GIPPSLAND, VICTORIA,
Monash Univ., Clayton (Australia). Dept. of Zoology.
For primary bibliographic entry see Field 05C.
W74-01813

PLANKTON SUCCESSION IN A NEWFOUNDLAND LAKE,
Memorial Univ. of Newfoundland, St. John's. Dept. of Biology.
For primary bibliographic entry see Field 05C.
W74-01818

AN APPROACH TO THE MODELING OF LAKES,
North Carolina Univ., Chapel Hill. Dept. of Environmental Sciences and Engineering.
For primary bibliographic entry see Field 05B.
W74-01819

LIMNOLOGICAL STUDIES ON A SOUTHEAST TEXAS MEANDER SCAR LAKE,
Lamar Univ., Beaumont, Tex. Dept. of Biology.
For primary bibliographic entry see Field 05C.
W74-01828

COPRECIPITATION OF PHOSPHATE WITH CARBONATES IN A MARL LAKE,
Michigan State Univ., Hickory Corners. W. K. Kellogg Biological Station.
A. Otsuki, and R. G. Wetzel.
Limnol Oceanogr. Vol 17, No 5, p 763-766. 1972. Illus.
Identifiers: *Carbonates, Lakes, *Marl lakes, *Phosphates, Photosynthesis, Precipitation.

High concentrations of phosphate ion precipitate with carbonates by simple coprecipitation as the pH of marl lake water is increased. High pH microenvironments associated with photosynthesis probably induce phosphate-carbonate precipitation, which in turn functions as one of several indirect density-dependent population controls.--Copyright 1973, Biological Abstracts, Inc.
W74-01843

BIOLOGY OF HARPACTICELLA INOPINATA (COPEPODA, HARPACTICOIDAE) IN LAKE BAIKAL, (IN RUSSIAN),
Biologo-Geograficheskii Nauchno-Issledovatelskii Institut, Irkutsk (USSR).
G. L. Okuneva.
Zool Zh. Vol 5, No 11, P 1637-1644. 1972. Illus. (English summary).
Identifiers: Biology, Copepoda, Harpacticella-Inopinata, *Harpacticoidae, Lakes, Longevity, *USSR (Lake Baidal).

The main concentrations of H. inopinata are located on the stony ground of the littoral zone (0-5 m); in the sublittoral zone (20-70 m) the population density is low; below 100 m only single specimens occur in Lake Baikal, USSR. During the year, the population density and biomass of H. inopinata suffer sharp fluctions. The first maximum of population density is in June-July, the second in Aug.-Sept. The maximum of population density of adult specimens reflects the maturation of new generations accompanied by the appearance of large numbers of young specimens. On the basis of laboratory observations, the duration of development from larva to adult at the water temperature from 8 to 10C varies from 39 to 48 days. The longevity of life of females is not less than 3 to 4 mo.Copright 1973, Biological Abstracts, Inc.
W74-01883

SEDIMENTATION OF SUSPENDED MATTER BY DREISSENA POLYMORPHA PALLAS AND ITS SUBSEQUENT UTILIZATION BY CHIRONOMIDAE LARVA,
Moscow State Univ. (USSR). Faculty of Biology and Soil Science.
For primary bibliographic entry see Field 05C.
W74-01904

REPORT ON OSCILLATORIA (SUBGENUS SPIRULINA) PLANTENSIS (NORDST.) BOURRELLY (CYANOPHYTA) IN CHAD, (IN FRENCH),
Office de la Recherche Scientifique et Technique Outre-Mer, Fort-Lamy (Chad).
For primary bibliographic entry see Field 05C.
W74-01905

PALEOHYDROLOGIC IMPLICATIONS OF SOME PLUVIAL LAKES IN NORTHWESTERN NEW SOUTH WALES, AUSTRALIA,
Wisconsin Univ., Milwaukee. Dept. of Geography.
G. H. Dury.
Geological Society of America Bulletin, Vol 84, No 11, p 3663-3676, November 1973. 12 fig, 3 tab, 32 ref.

Descriptors: *Paleoclimatology, *Pleistocene epoch, *Lakes, *Australia, Evaporation, Precipitation (Atmospheric), Water balance, Paleohydrology, Paleolimnology.

Some internally draining lakes in northwestern New South Wales, Australia, are contained in structural basins but owe their lack of external outlets to arid climate. Former high lake shorelines are defined in part by precipitated crusts or by deltas. Radiocarbon dated suggests that the high lake stands occurred not later than about 14,500 B.P. Whether or not the lakes existed at the time of maximum cold is uncertain; but they were associated with low paleotemperatures. Even in the lowest observed or estimated range of evapotranspiration, the precipitation equations indicate former precipitation about 50% greater than that of today. (Knapp-USGS)
W74-01959

OBSERVATIONS OF BEACH CUSPS AT MONO LAKE, CALIFORNIA,
Oregon State Univ., Corvallis. School of Oceanography.
For primary bibliographic entry see Field 02J.
W74-01961

SOME NATURAL PHYSICAL PROCESSES AFFECTING THE RECOVERY OF THE GREAT LAKES,
Ohio State Univ., Columbus.
For primary bibliographic entry see Field 05B.
W74-01974

BACTERIOLOGICAL STUDIES ON GRAVEL PIT LAKES (BAKTERIOLOGISCHE UNTERSUCHUNGEN AN BAGGERSEEN),
For primary bibliographic entry see Field 05A.
W74-01976

THE MAJOR IONS OF SOME LAKES AND OTHER WATERS IN QUEENSLAND, AUSTRALIA,
Monash Univ., Clayton (Australia). Dept. of Zoology.
I. A. E. Bayly, and W. D. Williams.
Aust J Mar Freshwater Res. Vol 23 No 2, p 121-131. 1972. Illus.
Identifiers: *Australia (Queensland), Bicarbonates, *Chlorides, *Ions, Lakes, Salinity, *Sodium.

Data relating to major inorganic ions are presented for 33 water bodies in eastern Queensland. Three of these draw supplies from underground sources, the remainder are lakes, lagoons, and an impoundment. The localities fall into 5 regions: a central-eastern region between Barcaldine and Charters Towers (9 localities); the Atherton Tablelands (8 localities); the coast near Cape Bedford (5 localities); the region between the Great Dividing Range and Ingham (7 localities) and near Rockhampton (4 localities). In the first region the localities are fresh except for Lake Buchanan; Na is the dominant cation in all cases; Cl clearly dominates the anions in Lake Buchanan, the pools peripheral to Lake Galilee, and the spring sampled, but is approximately co-dominant with bicarbonate in the remaining localities supplied by surface waters. In the second and fourth regions all the waters have low salinities (<100 or <300 ppm, respectively), divalent cations and bicarbonate are the most important ions, and sulfate is present in negligible amounts. In the third region all localities are very dilute (<60 ppm salinity) and Na and Cl dominate the ions; pH values are very low as also are concentrations of bicarbonate. In the fifth region Na and Cl ions again dominate but not to the same extent, and bicarbonate values are higher; salinities range from 106-607 ppm.--Copyright 1973, Biological Abstracts, Inc.
W74-01979

MERCURY POLLUTION OF LAKE ERIE ECOSPHERE,
Pennsylvania State Univ., University Park. Dept. of Nuclear Engineering.
For primary bibliographic entry see Field 05B.
W74-01985

PHYSICAL AND BIOLOGICAL DISPERSION OF THE HYPOLIMNETIC PHOSPHORUS OF A BOG LAKE SYSTEM,
Michigan Univ., Ann Arbor. School of Natural Resources.
For primary bibliographic entry see Field 05B.
W74-02047

AGE AND GROWTH OF THE CISCO IN ONEIDA LAKE, NEW YORK,
Cornell Univ., Ithaca, N.Y. Dept. of Natural Resources.
D. B. Smith.
N Y Fish Game. Vol 19, No 1, p 83-91. 1972.
Identifiers: *Age, *Cisco, Coregonus-Artedii, *Growth, Lakes, Mortality, *New York (Oneida Lakes), Annulus (False).

Age and growth determinations were made from scales of ciscoes (Coregonus artedii) collected from 1960-1970. A false annulus occurred each calendar year during the months of highest water temperature and lowest dissolved oxygen levels. Predominance of age I and II ciscoes indicated high mortality rates in the population. Possible causes of false annulus formation and the high mortality rate are discussed.--Copyright 1973, Biological Abstracts, Inc.

W74-02072

OCCURRENCE OF EUBOTHRIUM CRASSUM (BLOCH, 1779) (CESTODA: - PSEUDOPHYLLIDEA) IN BROWN TROUT SALMO TRUTTA L., AND RAINBOW TROUT S. GAIRDNERI RICHARDSON, 1836, FROM HAMNINGFIELD RESERVOIR, ESSEX,
Marine Lab., Aberdeen (Scotland).
R. Wootten.
J Helminthol. Vol 46, No 4, p 327-339. 1972.
Identifiers: *Brown trout, *Cestoda, Copepod, Eubothrium-Crassum, Pseudophyllaidea, *Rainbow trout, Reservoirs, Salmo-Gairdneri, Salmo-Trutta, *United Kingdom (Essex).

Both brown trout, S. trutta, and rainbow trout, S. gairdneri, from Hamningfield Reservoir, Essex, Great Britain and adjacent rearing channels, harbored E. crassum throughout 1968. There was no seasonal cycle of occurrence or maturation of the cestode. Brown trout (2+) introduced into the reservoir in the spring acquired heavy infestations during their first summer in the reservoir. Most of these cestodes are apparently lost from fish which are in the reservoir for 1 yr or more. Possible reasons for this loss are discussed. Rainbow trout from the rearing channels and reservoir were lightly infested. There was no heavy infestation of 2+ fish introduced into the reservoir in the spring. Speculations are made on reasons for the observed differences in infestation of brown and rainbow trout. There was an increase in mean length of E. crassum with increasing maturity. More cestodes were mature or gravid in rainbow trout than in brown trout and their mean lengths were greater. Plerocercoids of E. crassum were apparently absent from potential fish 2nd intermediate hosts in the reservoir, but were present in rainbow trout from the rearing channels (from which other fish species were excluded). The life cycle of E. crassum in Hamningfield Reservoir may involve only a single copepod intermediate host.--Copyright 1973, Biological Abstracts, Inc.
W74-02091

FURTHER STUDIES ON THE HYDROGRAPHY AND CHEMISTRY OF LAKE MANZALAH,
Alexandria Inst. of Oceanography and Fisheries (Egypt).
S. D. Wahby, S. F. Youssef, and N. F. Bishara.
Bull Inst Oceanogr Fish. 2: p 399-422. 1972. Illus.
Identifiers: *Hydrography, Lakes, *United Arab Republic (Lake Manzalah), *Lake chemistry.

The hydrography and chemistry of Lake Manzalah, United Arab Republic waters were studied during 1967 after the construction of the Aswan High Dam. The freshwater formerly discharged through the Nile connections during flood time is thought to be compensated by the increased amount of drainage water discharged at the southern and western parts of the lake. The nutrient level of the lake during 1963 and 1967 is compared.--Copyright 1973, Biological Abstracts, Inc.
W74-02096

CONTRIBUTION TO THE LIMNOLOGY OF HIGH MOUNTAIN LAKES IN CENTRAL AMERICA, (IN GERMAN),
Vienna Univ. (Austria).
H. Loeffler.
Int Rev Gesamten Hydrobiol. Vol 57, No 3, p 397-408. 1972. Illus.
Identifiers: *Algae, Central America, Caldocera, Copepods, *Costa Riva, *Distribution (Paleogeographic), *Guatemala, Lakes, Limnology, Mountain lakes, *Harpacticoids.

Tropical high mountain lakes of Central America, confined to Guatemala and Costa Rica, are mainly of the Paramo type, the only exception being freshwater on the karstic high plateau of the Cordillera de los Cuchumantanes. With respect to their low content of electrolytes and their algal composition, most of them are similar and resemble lakes and freshwater localities in bordering Mexico and South America (Nevadas de Santa Marta and Merida). In contrast to the algae and Cladocera, the harpacticoids and to a lesser extent, the calanoids and cyclopoids of Central America high mountain lakes have a distribution which, to an astonishing degree, reflects paleogeographic facts. Passive dispersal must have played only a very subordinate role in the distribution of Central American high mountain harpacticoids.--Copyright 1973, Biological Abstracts, Inc.
W74-02107

FEEDING OF THE FERGANA BREAM (ABRAMIS BRAMA BERGI NATIO FERGANENSIS MAKSUNOV), (IN RUSSIAN),
Akademiya Nauk Tadzhikskoi SSR, Dushanbe. Institut Zoologii i Parazitologii.
L. V. Kondur.
Izv Akad Nauk Tadzh SSR Otd Biol Nauk. 2. p 47-52, 1972, Illus.
Identifiers: Abramis-brama-bergi-ferganensis, Age, *Bream (Fergana), Competition, *Feeding, Locale, Season, *USSR (Tadzhikistan), Weight, Reservoirs.

The weight characteristics of the feeding of the Fergana (Abramis brama bergi natio ferganensis) inhabiting the Kairak-Kum reservoir (Tadzhikistan, USSR) are given. The intestines of 130 fishes 7-28 cm long were investigated. The seasonal, local, and age-related differences in the feeding of this species were traced. The food supply of this species and the competitive relations for food with other fish species are shown.--Copyright 1973, Biological Abstracts, Inc.
W74-02111

DETERMINATION OF VITAMIN B12, THIAMINE AND BIOTIN IN LAKE TAHOE WATERS USING MODIFIED MARINE BIOASSAY TECHNIQUES,
California Univ., San Diego, La Jolla. Inst. of Marine Resources.
For primary bibliographic entry see Field 05C.
W74-02118

WATER-QUALITY RECORDS FOR SELECTED RESERVOIRS IN TEXAS, 1970-71 WATER YEARS,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 02K.
W74-02139

2I. Water in Plants

BIBLIOGRAPHY ON OPTIMIZATION OF IRRIGATION SYSTEMS,
Illinois Univ., Urbana. Dept. of Civil Engineering.
For primary bibliographic entry see Field 03F.
W74-01657

THE DIFFUSION RESISTANCE AND WATER STATUS OF LEAVES OF BETA VULGARIS,
Nottingham Univ. (England). Dept. of Physiology and Environmental Studies.
For primary bibliographic entry see Field 03F.
W74-01734

SOIL PROPERTIES IN RELATION TO THE GROWTH AND YIELD OF OIL PALM (ELAEIS GUINEENSIS JACQ.) IN SURINAM,
Landbouwproefstation, Paramaribo (Surinam).
For primary bibliographic entry see Field 02G.
W74-01736

THE INFLUENCE OF RAINFALL ON THE POPULATION OF NEMATODES IN BANANA FIELD,
Pakistan Council of Scientific and Industrial Research, Karachi.
M. Saeed, and S. H. Ashrafi.
Pak J Sci Ind Res, Vol 14, No 4/5, p 403-404, 1971.
Identifiers: *Banana fields, *Nematodes, *Rainfall, Animal population.

The population of stylet and non-stylet-bearing nematodes was high before the rains. After 6-in. rains the population of stylet-bearing nematodes was found to be 1/5 of the population before the rains. The population of non-stylet-bearing nematodes was also affected, being reduced by almost one half.--Copyright 1973, Biological Abstracts, Inc.
W74-01737

CONCEPTS IN VEGETATION/SOIL SYSTEM DYNAMICS: POST STEADY-STATE,
Australian National Univ., Canberra. Dept. of Forestry.
G. N. Park.
Tuatara, Vol 19, No 3, p 105-123, 1972.
Identifiers: Diversity, *Forests, Moisture, Soil, Species, *Vegetation, *Soil-water-plant relationships.

Terminology and concepts of temporal changes in the vegetation/soil system are reviewed. The post steady-state is any development beyond the situation in which a forest is maintaining both a healthy structure and constant composition over a soil with which it has an adequate nutrient balance and from which advanced gleying and swamping and loss of essential elements are absent. Literature is reviewed relating to the close relationship among deteriorating forest structure, increasing species diversity and increasingly wetter, less aerated and more organic soils.--Copyright 1973, Biological Abstracts, Inc.
W74-01739

FOOD SPECIALIZATION BY INDIVIDUAL TROUT,
J. E. Bryan, and P. A. Larkin.
J Fish Res Board Can, Vol 29, No 11, p 1615-1624, 1972, Illus.
Identifiers: *Fish food, Salmo-clarki, Salmo-gairdneri, Salvelinus-fontinalis, Specialization, *Trout.

Analyses of stomach contents showed that the kinds of prey eaten by brook trout (Salvelinus fontinalis), cut-throat trout (Salmo clarki), and rainbow trout (Salmo gairdneri) were seldom distributed at random among the individuals. Repeated observation of food eaten by individuals in a stream and ponds showed that prey types were eaten in proportions which were characteristic for an individual. Specialization occurred on several different kinds of prey. Although the degree of specialization was higher during shorter intervals, some specialization may have persisted for half a year. There were no striking correlations between degree of specialization and other individual properties such as size, growth rate, weight of food, number of food items, previous specialization, or area of recapture. In addition to the observations on trout in relatively undisturbed habitats, a field experiment was conducted using laboratory-reared rainbow trout held in small ponds. The food of each trout in the experiments was sampled repeatedly. In analysis of variance, interaction among the individuals and kinds of prey eaten showed that food specialization occurred. Both the absolute and relative abundance of potential prey were constant during the experiment.--Copyright 1973, Biological Abstracts, Inc.
W74-01743

CLOUD MOISTURE INTERCEPTION IN THE LUQUILLO MOUNTAINS OF PUERTO RICO,
P. L. Weaver.

Caribb J Sci, Vol 12, No 3/4, p 129-144, 1972, Illus.
Identifiers: *Cloud moisture, Hardwoods, Interception, Moisture, Mountains, *Puerto Rico (Luquillo Mountains), Regressions, Vegetation, *Trees.

'Pico del Este' in the cloud forest of the Luquillo Mountains of Puerto Rico was studied in 3 zones: the windward, ridge and leeward. Components of the arboreal vegetation, humidity and temperature was recorded, Throughfall was measured in 180 fixed No. 10 cans; stemflow, on 12 trees of varying species and dbh (diameter breast height) class. Throughfall regressions on rainfall were significant within and among working zones. Grouped stemflow regressions on rainfall averaged 5.1, 9.6 and 2.8% of rainfall on the windward, ridge and leeward, respectively. Total precipitation was estimated at 99 to 106% of rainfall, representing a net gain of moisture from 0.09 to 0.15 in., over that received in the eastern hardwoods, per inch of rainfall.--Copyright 1973, Biological Abstracts, Inc.
W74-01747

ASSOCIATION OF SOME AQUATIC PLANTS OF THE LOWER AMUR WITH DEFINITE DEPTHS OF WATER, (IN RUSSIAN),
M. P. Shilov.
Byull Mosk O-Va Ispyt Prir Otd Biol. Vol 77, No 2, p 96-103, 1972. Illus. (English summary).
Identifiers: *Aquatic plants, Association, Nymphoides-Peltatum, Potamogeton-Perfoliatus, Sagittaria-Natans, *USSR (Lower Amur), Utricularia-Vulgaris, *Water depth.

A characteristic is given of the association of some of the most widely distributed aquatic plants of the Lower Amur (USSR) (Nymphoides peltatum, Sagitaria natans, Utricularia vulgaris, Potamogeton perfoliatus, etc.) with definite depths of water. The predominant, optimum, minimum and maximum depths of their growth are determined, as well as the critical depths where the frequency of their occurrence shows a sharp decrease. The concept is introduced of threshold projective coverages, at which either a sharp decrease or an increase in the frequency of occurrence of aquatic plants is observed.--Copyright 1973, Biological Abstracts, Inc.
W74-01751

ABSORPTION OF WATER VAPOR BY THE ABOVEGROUND PARTS OF THE KARAKUM DESERT PLANTS, (IN RUSSIAN),
Akademiya Nauk SSSR, Leningrad. Botanicheskii Institut.
V. M. Sveshnikova.
Bot Zh. Vol 57, No 8, p 880-888, 1972. (English summary).
Identifiers: *Absorption, *Desert plants, Dicots, Moisture, Soils, *USSR (Karakum), *Water vapor.

The purpose was the assessment of the absorption of atmospheric water vapor by leaves or shoots of the Karakum desert (USSR) plants (Haloxylon aphyllum, H. persicum, Salsola richteri, Ammodendron conollyi, Calligonum caput medusae, S. subaphylla, Ephedra strobilacea, Smirnowia turkestana, Convulvulus korolkovii, Heliotropium arguzioides, Horaninovia ulcina, Kochia schrenkiana, Tamarix ramosisima) which suffer extreme arid conditions. Several authors have proved the substantial significance of processes of water vapor condensation in different layers of the soil profile for the aquatic balance of Kara-Kum soils. Experiments for studying the absorption of water vapor by the 13 species of widespread plants, at different periods of vegetational season and at different temperature were carried out. The majority of species proved to be capable of absorbing water vapor from the atmosphere, but species are clearly differentiated according to the quantity of vapor absorbed and the degree of the absorption process constancy.--Copyright 1973, Biological Abstracts, Inc.
W74-01760

SECONDARY LEAF FALL OF HEVEA BRASILIENSIS: METEOROLOGICAL AND OTHER FACTORS AFFECTING INFECTION BY COLLETOTRICHUM GLOEOSPORIOIDES,
Rubber Research Inst. of Malaya, Kuala Lumpur (Malaysia).
R. L. Wastie.
Ann Appl Biol. Vol 72, No 3, p 283-293, 1972.
Identifiers: Abrasion, Age, Bacteria, *Colletotrichum-gloeosporioides, *Hevea-brasiliensis, Humidity, *Infection, *Leaf fall, Meteorological studies, Temperature, Wetness...

The lower leaf surface of H. brasiliensis was more susceptible to infection by C. gloeosporioides than the upper. Few lesions were produced if spore drops on susceptible leaves were allowed to dry. Lesion development after 72 hr was quickest at 21C. slower at 26.5C and was stopped at 32C, probably because of bacteria in the inoculation drop. On leaflets aged 7 days from bud-burst, the effective spore dose for 50% of leaflets infected (ED50 (median effective dose)) after 16 hr incubation was 260 spores and after 46 hr, 120 spores/infection droplet; the minimum ED50 for the upper leaf surface was about 4 spores mm2. Leaflets 15 days old, which are normally resistant, were rendered susceptible by abrading the surface with carborundum powder. Spores caught in a Hirst spore trap reached a daily maximum at 23 hr, at rates of up to 440 spores/m3 air/hr, but fell to low concentrations as the humidity dropped during the daytime, and also during rain. There was some correlation between disease severity and duration of 97-100% relative humidity, and moderate to severe defoliation of clone PB86 occurred when this reached 13.5 hr/day. Rainfall increases infection by prolonging the period of atmospheric saturation and leaf wetness.--Copyright 1973, Biological Abstracts, Inc.
W74-01764

DIURNAL FLUCTUATIONS OF WATER CONTENT DURING VEGETATIVE CYCLE OF AN HOMOGENOUS PLANT POPULATION: LINUM USITATISSIMUM L. VAR. REINA, (IN FRENCH),
Y. Boyer.
Oecol Plant. Vol 7, No 3, p 259-278, 1972. Illus. (English summary).
Identifiers: *Diurnal fluctuations, Drought, Homogeneous plants, *Linum-Usitatissimum, Plant population, *Vegetative cycle.

The diurnal flucturations of the water content of plants in situ at different development stages and growing under natural conditions was studied by a non-destructive method. The experimental plots were sown at a few weeks' interval; thus a comparison of the behavior of plants at corresponding development stages under different environmental conditions could be made. The variability of the behavior depended on physiological stage and on the present climatic conditions (possibly on the former climatic conditions). In some cases of atmospheric and adaphic drought, the aged stems lost water apparently to the young stems. The lower part of the flax stems may act as storage organs.--Copyright 1973, Biological Abstracts, Inc.
W74-01767

ENTRY OF CHEMICAL ELEMENTS--ANALOGUES (STRONTIUM-90-CALCIUM AND CESIUM-137-POTASSIUM) INTO PLANTS IN RELATION TO SOIL MOISTURE, (IN RUSSIAN),
E. N. Karavaeva, and I. V. Molchanova.
Ekologiya. Vol 2, No 5, p 96-98. 1971.
Identifiers: Bromus-Inermis, Calcium, *Cesium-137, Chemical elements, Festuca-Arundinacea, Festuca-Pratensis, Festuca-Rubra, Moisture, Potassium, *Soil moisture, *Strontium-90, *Soil-water-plant relationships.

The presence of 90Sr relative to its chemical analogue Ca and of 137Cs relative to K was studied in relation to soil moisture in Festuca pratensis, F. arundinaceae, F. rubra and Bromus inermis on soddy-podzolic, soddy-meadow and peaty-gley soils. Solutions of Cl compounds of 90Sr and 137Cs without stable carriers were introduced into soil with a moisture content of 80, 50 and 25%. The Ca content in above-ground parts did not vary significantly according to soil, through the metabolic Ca content in soddy-meadow soil was 6 times greater than in the other soils. Soil moisture did not have a substantial effect on the 90Sr/Ca ratio in the plants, which was related only to soil type, the maximum being observed in soddy-podzolic soil. Analogous data was obtained for 137Cs-K. The maximum value for this ratio was characteristic of peaty-gley and soddy-podzolic soils.--Copyright 1973, Biological Abstracts, Inc.
W74-01783

CIRSIO-POLYGONETUM MEADOWS IN THE PROVINCE OF SZCZECIN (IN POLISH),
Instytut Melioracji i Uzytkow Zielonych, Szczecin (Poland). Terenowy Oddzial Badawczy.
R. Kochanowska.
Fragm Florist Geobot (Krakow), Vol 17, No 1, p 129-145, 1971, Illus, English summary.
Identifiers: Cultivation, *Meadows (Cirsio-polygonetum), *Poland (Szczecin), Polygonetum, Soil humidity, Subassociations, *Mud soils.

Results are summarized of a phytosociological investigation in 1964-1966 in the meadows classed as Cirsio-Polygonetum Tx. 51. The floral material collected enabled the distinction of 4 sub-associations: Cirsio-Polygonetum caricetosum fuscae, Cirsio-Polygonetum caricetosum gracilis, Cirsio-Polygonetum avenastretosum subass. nova, Cirsio-Polygonetum deschampsietosum subass. nova. In the territory investigated (Poland), the Cirsio-Polygonetum association occurs mainly on muck-peaty soils formed in valley bogs of various types. It is more rarely encountered in muddy-gley and muddy soils. The occurrence of the particular sub-associations is connected with the stage of the muck-forming process in the peaty soils and their humidity. The initial stage of Cirsio-Polygonetum in newly established meadows originates when the meadows are not manured, and cultivated and mowed too late.--Copyright 1973, Biological Abstracts, Inc.
W74-01815

EFFECTS OF URBANIZATION ON THE SALAMANDER DESMOGNATHUS FUSCUS FUSCUS,
Emory Univ., Atlanta, Ga. Dept. of Biology.
P. N. Orser, and D. J. Shure.
Ecology, Vol 53, No 6, p 1148-1154, 1972, Illus.
Identifiers: Density, Desmognathus-fuscus-fuscus, *Georgia (Atlanta), Invertebrates, Prey, *Salamanders, *Urbanization.

Five spring-fed streams near Atlanta, Georgia, comprise an urbanization gradient ranging from severely disturbed to undisturbed conditions. Population densities of the dusky salamander, D. fuscus fuscus, were estimated within these streams and were inversely proportional to the degree of urbanization. Differences in the chemical parameters among the stations, while reflecting habitat disruption, were not considered limiting factors on salamander densities. Analysis of invertebrate prey availability indicated no significant difference among the stations. Salamander populations were significantly affected by scouring caused by increased runoff and soil erosion in disturbed areas. Differences in salamander densities were also attributed to relative stability of the bank soils and availability and dispersal of protective cover. More cohesive substrates and increased availability of ground cover at the less disturbed areas offered greater stability against erosion and better habitats for salamander burrowing. Urbanization thus creates physical instability within stream habitats. Such instability results in a

disruption of trophic structure by a reduction or loss of this major stream predator.--Copyright 1973, Biological Abstracts, Inc.
W74-01827

EFFECT OF SMOKE-PROCESSING ON MUDDY ODOR AND TASTE IN RAINBOW TROUT (SALMO GAIRDNERI),
Fisheries Research Board of Canada, Winnipeg (Manitoba). Freshwater Inst.
D. G. Iredale, and D. Rigby.
J Fish Res Board Can. Vol 29, No 9, p 1365-1366. 1972.
Identifiers: *Canada, Lakes, *Odor (Muddy), *Rainbow trout, Rearing, Salmo-Gairdneri, *Smoke processing, *Taste.

Because of problems with a 'muddy' odor and taste occurring in rainbow trout reared commercially in some small prairie lakes in central Canada, full production potential is not realized. The possibility of masking the undesirable condition by smoke-processing was investigated and was a valid method of utilizing the majority of the affected fish.--Copyright 1973, Biological Abstracts, Inc.
W74-01892

INFLUENCE OF BIRDS, STONES AND SOIL ON THE ESTABLISHMENT OF PASTURE JUNIPER, JUNIPERUS COMMUNIS, AND RED CEDAR, J. VIRGINIANA IN NEW ENGLAND PASTURES,
Massachusetts Univ., Amherst. Dept. of Botany.
R. B. Livingston.
Ecology. Vol 53, No 6, p 1141-1147. 1972. Illus.
Identifiers: Birds, Dispersal, Germination, *Juniper, Juniperus-Communis, Juniperus-Virginiana, *New England, Pastures, *Red-Cedar, Seeds, Soils, Stones, Turdus-Migratorius, *Robins.

In New England the pasture juniper, J. communis, var. depressa Pursh, usually occurs in pastures adjacent to stones, whereas the red cedar, J. virginiana var. crebra Fern. et Grisc., occurs either at stoneside or in interstonal areas. In non-stony pastures, red cedar is often dominant and pasture juniper absent. Attempts were made to determine the effects of the stoneside position. During their fall migrational flights, robins, Turdus migratorius Linnaeus, feed heavily on the berries of both pasture juniper and red cedar, and are effective disseminators of the seed. During feeding periods, the robins come to rest on exposed field stones and the seed in their droppings becomes concentrated on the stones. The seeds are subsequently washed and planted into frost-heave cracks adjacent to the stones. The burial of pasture juniper seed assures their retention in a moist condition during the long, double stratification period required for their germination. Red cedar seed requires only a single cold stratification period, and this may be encountered even when seeds are planted on soil surfaces. Seedlings developing in the stoneside frost-heave crack are protected from trampling or grazing, and they receive extra moisture from their stone micro-watershed. Seedling junipers make their best growth in compacted soils, like those away from stoneside, and although birds are effective disseminators or their seed, the passage of seed through the birds gut inhibits germination. Fortuitous planting of seed on exposed stones introduces pasture juniper and red cedar to a micro-habitat that more than compensates for reduced germination and slower growth.--Copyright 1973, Biological Abstracts, Inc.
W74-01894

REPRODUCTIVE VARIATIONS IN THE ROUND-TAILED GROUND SQUIRREL AS RELATED TO WINTER RAINFALL,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
H. G. Reynolds, and F. Turkowski.
J Mammal. Vol 53, No 4, p 893-898. 1972. Illus.
Identifiers: *Arizona, *Ground squirrel (Round-tail), *Rainfall, Reproductive, Spermophilus-Tereticaudus, Vegetation, Winter.

Luxuriance of annual vegetation, as produced by abundant winter rainfall, seems to influence inception of breeding and litter size of round-tailed ground squirrels (Spermophilus tereticaudus) in southern Arizona.--Copyright 1973, Biological Abstract, Inc.
W74-01895

HOT SPRING MICROBIAL COMMUNITIES RECREATED IN MODIFIED 'WINOGRADSKI COLUMNS,'
Oregon Univ., Eugene. Dept. of Biology.
R. W. Castenholz.
Limnol Oceanogr. Vol 17, No 5, p 767-771. 1972. Illus.
Identifiers: *Hot springs, *Microbial communities, Spring, *Winogradski columns, Sediments, Thermal gradient.

A modification of the 'Winogradski column' in which hot spring sediment and inoculum is used has recreated the sequencie of thermophilic microbial communities that develop in the normal thermal gradient of the source spring. The mixed sediment and inoculum is packed into glass cylinders filled with spring water and a spot source of heat applied with an incandescent flood lamp or IR spot lamp. A thermal gradient from over 90C to less than 40C can be established along the sediment-glass interface. Photosynthetic and other microbial species developed in their normal range of temperature and have been maintained for several weeks or months.--Copyright 1973, Biological Abstracts, Inc.
W74-01899

OBSERVATIONS ON THE BIOLOGY OF NOTHOBRANCHIUS GUENTHERI (PFEFFER) (CYPRINODONTIDAE), AN ANNUAL FISH FROM THE COASTAL REGION OF EAST AFRICA,
Chelsea Coll. of Science and Technology, London (England). Dept. of Zoology.
R. G. Bailey.
Afr J Trop Hydrobiol Fish. Vol 1 No 2, p 33-43. 1972. Illus.
Identifiers: Africa, Aggression, Annual, Biology, Coastal regions, *Cyprinodontidae, Diet, Fish, *Nothobranchius-Guentheri, Nothobranchius-Melanospilus, Reproduction, Synonymy, *Tanzania.

N. guentheri is found in seasonal pools and streams in the coastal region of Tanzania. A population recurring annually in a pond near Kilosa was studied. Growth in length was rapid and maximum mean lengths were attained within 11-12 and 7-8 wk of hatching by males and females, respectively. Males grew larger and exhibited wider variation in length than females. N. guentheri shows clear sexual dichromatism. No significant inequality in the sex ratio was found. Females with ripe eggs were found 7-8 wk after hatching. Spawning continued throughout adult life and fecundity increased markedly with increasing lengths. In laboratory aquaria, aggressiveness between adult males was noted and females were actively driven on to the substratum preparatory to spawning. The diet of the fish pond consisted chiefly of aquatic and terrestrial insects, of which midge larvae and pupae were the most common. N. guentheri is exploited by man in the aquarist trade and for the biological control of mosquitoes. An extended redescription of the species is appended which includes N. melanospilus (Pfeffer) as a synonym.--Copyright 1973, Biological Abstracts, Inc.
W74-01981

COMPARATIVE FOOD HABITS OF FOUR SPECIES OF STREAM-DWELLING VERTEBRATES (DICAMPTODON ENSATUS, D. COPEI, COTTUS TENUIS, SALMO GAIRDNERI),
Idaho Univ., Moscow. Dept. of Entomology.
A. L. Antonelli, R. A. Nassbaum, and S. D. Smith.
Northwest Sci. Vol 46, No 4, p 277-289. 1972. Illus.
Identifiers: Comparative studies, *Cottus-tenuis, *Dicamptodon-copsi, *Dicamptodon-ensatus, *Food habits, Salmo-gairdneri, Species, Stream, Vertebrates, *Washington (Maratta Creek), *Rainbow trout.

Dicamptodon spp., S. gairdneri, and C. tenuis were collected from Maratta Creek, Washington, at monthly intervals for one year. Examination of their stomach contents relative to availability of stream organisms indicates that feeding is, for the most part, opportunistic. C. tenuis exhibits a degree of selectivity which may impose some competitive stress upon it. Dicamptodon spp. appears to feed almost entirely on benthos while S. gairdneri feed on organisms throughout the stream. The relative rarity of sculpins may suggest that competition with the other 2 vertebrates is approaching completion. Competition between Salmo and Dicamptodon spp. is relaxed somewhat by diversity of feeding habits and the probably subterranean habits of Dicamptodon spp. during part of the year. The feeding habits of the salmonid and salamanders suggest only 'partial exculsion.'--Copyright 1973, Biological Abstracts, Inc.
W74-01982

A RECORDING DEVICE FOR MEASURING RESPIRATORY MOVEMENTS OF AQUATIC INSECTS,
Waterloo Lutheran Univ. (Ontario). Dept. of Biology.
N. N. Kapoor.
Proc Entomol Soc Ont. 102: p 71-78. 1971 (1972).
Identifiers: *Aquatic insects, *Measurement, *Plecoptera, Recording devices, *Respiratory movement.

A device for detecting and measuring respiratory movements of aquatic insects (Plecoptera) was designed and constructed. The apparatus is capable of instataneously detecting and measuring undulating body movements.--Copyright 1973, Biological Abstracts, Inc.
W74-01996

PERMEABILITY OF THE CAMBIUM TO AIR IN TREES ADAPTED TO WET HABITATS,
Kentucky Univ., Lexington. Dept. of Forestry.
D. Hook, and C. L. Brown.
Bot Gaz. Vol 133, No 3, p 304-310. 1972. Illus.
Identifiers: *Cambium, Carbon dioxide, Fraxinus-Pennsylvanica, Green ash, Liquidambar-Styraciflua, Liriodendron-Tulipifera, Nyssa-Aquatica, Oxygen, *Permeability, Plantanus-Occidentalis, Sweet-Gum, Sycamore, *Trees, Tulip Tree, Tupelo, *Wet habitats.

The permeability of the cambirum to gas exchange varies significantly among tree species. The amount of tension required to pull air across the cambium of water tupelo (Nyssa aquatica) and green ash (Fraxinus pennsylvanica) is sufficiently low to permit free gas exchange with the atmosphere, whereas air movement is restricted across the cambia of sweetgum (Liquidambar styraciflua), yellow poplar (Liriodendron tulipifera) and sycamore (Platanus occidentalis). Water tupelo and green ash stems possess prominent intercellular spaces among the cambial ray initials forming an open interconnecting aeration system between the xylem and phloem rays on either side. Similar openings in the cambirum are absent or less than 1 micro in size in the other species examined. In mesophytic trees the transpiration stream undoubtedly plays a vital role in supplying O to, and removing CO2 from the actively dividing and differentiating cells on the xylem side of the relatively impervious cambium. Conversely, in hydrophytes, where air is often

limiting to the roots and water is plentiful, the cambium is increasingly more permeable to air.--Copyright 1973, Biological Abstracts, Inc.
W74-01998

THE BIOLOGY OF THE SOLDIER FISH, GYMNAPISTES MARMORATUS (PISCES:SCORPAENIDAE),
James Cook Univ. of North Queensland, Townsville (Australia). School of Biological Science.
C. J. Grant.
Aust J Mar Freshwater Res, Vol 23, No 2, p 151-163, 1972, Illus.
Identifiers: Age, *Australia (Tasmania), Bertalanffy, Biology, Fish foods, Growth, Gymnapistes-marmoratus, Pisces, Reproduction, *Scorpaenidae, *Soldier fish.

Various aspects of the biology of the scorpaenid G. marmoratus were studied during 1971 in the D'Entrecasteaux Channel, southern Tasmania. The species ranges from Darwin counterclockwise around the Australian coast to Sydney, but appears not to inhabit Queensland waters. In Tasmania the species commonly occurs at depths of 20 m or less, over sand or mud bottom with a light Zostera covering. During the day the fish lie motionless and are excellently camouflaged, possessing disruptive yellow and brown marbled markings; most of their activity occurs at night. Fish species associated with G. marmoratus are those typical of the bottom habitat of estuarine communities. Age determination by interpretation of annuli in burned otoliths was simple and accurate, and the population studied comprised individuals up to 14 yr of age. Growth was adequately described by the von Bertalanffy equation of organic growth, being of the decaying exponential type which defined the growth of G. marmoratus as: Lt ± 21.4 (1-exp (0.1168 (t + 2.3))). Reproduction is initiated at approximately 2 yr of age and spawning occurred in Aug.-Sept. Fecundity may be described related to length by the expression F ± 0.08L4.08. Stomach analysis indicated that shrimps and crabs made up a large portion of the diet of smaller fish, while the larger fish consumed other fish species as well.--Copyright 1973, Biological Abstracts, Inc.
W74-02000

SOME CHARACTERISTICS OF SOIL AND PERENNIAL VEGETATION IN NORTHERN MOJAVE DESERT AREAS OF THE NEVADA TEST SITE,
California Univ., Los Angeles. Lab. of Nuclear Medicine and Radiation Biology.
For primary bibliographic entry see Field 05B.
W74-02024

SIMPLIFIED APPARATUS FOR DETERMINING LEAF WATER POTENTIALS IN PINE NEEDLES,
New Zealand Forest Service, Rotorua.
H. H. Gifford.
NZJ For Sci. Vol 2, yno 2, p 284-286. 1972. Illus.
Identifiers: Apparatus, *Leaf water potential, *New Zealand (Rotorua), *Pine needles.

For work on pine trees at the Forest Research Institute, Rotorua, New Zealand, a small pressure chamber was designed, and the chamber cap which holds the plant material was modified to permit easy operation and fast working. By using standard high pressure parts for constructing the chamber, its cost was lowered without reducing safety.--Copyright 1973, Biological Abstracts, Inc.
W74-02075

DIGENETIC TREMATODES OF FISH FROM VOLTA RIVER DRAINAGE SYSTEM IN GHANA PRIOR TO CONSTRUCTION OF VOLTA DAM AT AKOSOMBO IN MAY 1964,
State Univ. of New York, Binghamton. Dept. of Biology.
J. Fischthal, and J. D. Thomas.
J Helminthol. Vol 46, No 1, p 91-106. 1972, Illus.
Identifiers: Akosombo, Allocreadium-Ghanensis, Construction, Dam, *Drainage, Eumasenia-Proteropora, Fish, *Ghana (Volta River), Rivers, Species, *Trematodes (Digenetic).

The following trematodes were collected from fish from the Volta River drainage system, Ghana: Lobatostoma sp., Nephrocephalus bagri-incapsulatus, Phyllodistomum symmetrorchis, Opisthorchis piscicola, Allocreadium ghanensis from the rectum of Synodontis sp., Eumasenia ghanensis, E. proteropora (Thomas, 1958), Siphodera ghanensis, Sterrhurus musculus, Tubolovesicula lindbergi, Brevicaecum niloticum and Sandonia sudanensis.--Copyright 1973, Biological Abstracts, Inc.
W74-02077

INFLUENCE OF ENVIRONMENT AND LEAF EXCISION ON GAS EXCHANGE OF OAT LEAVES,
Guelph Univ. (Ontario). Dept. of Crop Science.
J. G. Criswell, and R. M. Shibles.
Iowa State J Res. Vol 47, No 2, p 129-139. 1972, Illus.
Identifiers: Avena-Sativa, Environment, *Gas exchange, *Leaf excision, Light, *Oat leaves, Photosynthesis, Temperature, Relative humidity.

Effects of light, temperature, relative humidity, and leaf excision on gaseous exchange processes of oat (Avena sativa L.) leaves were tested. Maximum net photosynthetic rates of attached oat leaves were achieved at about 27 degrees C leaf temperature and 200 w m-2 irradiance; net photosynthesis was insensitive to relative humidity over a wide range. Even under moderately high humidity, net photosynthesis of detached leaves began to decline as early as 20 min after excision. This is about the time required, after insertion into the leaf chamber, for induction to maximal net gas exchange of attached leaves.--Copyright 1973, Biological Abstracts, Inc.
W74-02084

ARCEUTHOBIUM PUSILLUM: MOISTURE REQUIREMENTS FOR GERMINATION AND RADICLE GROWTH,
Maritimes Forest Research Center, Fredericton (New Brunswick).
J. M. Bonga.
Can J Bot. Vol 50, No 11, p 2143-2147. 1972, Illus.
Identifiers: *Arceuthobium-Pusillum, *Germination, Humidity, Moisture requirements, *Radicle growth, *Spruce, Seeds, Parasites.

Seeds of A. pusillum (causative agent of witches' broom of spruce) were exposed to water, various relative humidities, and water followed weekly by various periods of dryness. With water, the seeds germinated more rapidly and produced longer radicles than with water in vapor form at any of the relative humidities used. At relative humidities of 90-100%, most of the seeds eventually germinated but the radicles remained short. Below 90% relative humidity, only a few seeds germinated. Some seeds germinated and produced radicles if exposed to weekly dry periods of up to 4 days. The distribution of the parasite is affected directly by water in liquid form and indirectly by water in vapor form.--Copyright 1973, Biological Abstracts, Inc.
W74-02088

EFFECT OF WATER DEPTH ON THE INFECTION OF BIOMPHALARIA GLABRATA BY MIRACIDIA OF ST. LUCIAN SCHISTOSOMA MANSONI UNDER LABORATORY AND FIELD CONDITIONS,
For primary bibliographic entry see Field 05C.
W74-02097

SEASONAL CHANGES IN SODIUM AND CHLORIDE CONCENTRATION OF SALTBUSH (ATRIPLEX SPP.) LEAVES AS RELATED TO SOIL AND PLANT WATER POTENTIAL,
Commonwelath Scientific and Industrial Research Organization, Deniliquin (Australia). Riverina Lab.
M. L. Sharma, J. Tunny, and D. J. Tongway.
Aust J Agric Res. Vol 23, No 6, p 1007-1019. 1972. Illus.
Identifiers: Atriplex-Nummullaria, Atriplex-Spp, Atriplex-Vasicaria, *Chloride concentration, Rain, *Saltbush leaves, Seasonal, *Sodium, Soils, Summer, *Salinity.

Na and chloride concentrations in mature leaves of 2 Atriplex species, A. nummularia and A. vesicaria, growing on 2 clay soils were monitored during June 1969-June 1970. The corresponding soil water content (W), osmotic potential (pi) and matrix potential (tau) of soil water, and relative leaf water content (w) were also evaluated. Both the Na and chloride concentrations in leaves increased progressively with the corresponding decrease in W in Sept.-Dec., reaching about twice their original values. From Dec. on, Na and chloride remained relatively stable until April when they started to decline progressively with a steady increase in W. Intermittent rains during summer changed W for short periods, but the leaf salinity remained unchanged. Irrespective of soil, A. nummularia leaves contained more Na than A. vesicaria, while the reverse was true for chloride. Invariably leaf salinity was strongly correlated with w, tau, and pi, but the correlation with w was significant only for A. vesicaria. Empirical equations fitted to indicate the relation of Na and chloride to each of the variables and also to multiple regressions of (pi, tau) and (W, w) are given. Various factors which might be responsible for inducing seasonal variability in the leaf salinity are discussed. It appears that the higher salinity build-up in Atriplex during summer is not only due to increased electrolyte concentration in the growing medium and to high transpiration rates, but is also associated with drought tolerance by these plants.--Copyright 1973, Biological Abstracts, Inc.
W74-02105

OBSERVATIONS ON SAMPLING PRE--IMAGINAL POPULATIONS OF BLACKFLIES (DIPT., SIMULIIDAE) IN WEST CAMEROON,
For primary bibliographic entry see Field 07B.
W74-02108

THE ENERGETICS OF FEEDING, METABOLISM AND GROWTH OF PERCH (PERCA FLUVIATILIS L.),
D. J. Solomon, and A. E. Brafield.
J Anim Ecol. Vol 41, No 3, p 699-718. 1972. Illus.
Identifiers: *Feeding, *Growth, *Metabolism, Perca-Fluviatilis, *Perch, Energy budget.

The energy relationships of feeding, metabolism and growth of a carnivorous freshwater fish, Perca fluviatilis, fed on Gammarus pulex is studied. Energy budgets for 28-day periods are presented for fish of different sizes and feeding regimes. Generally the agreement between energy measured as ingoing and outgoing was good; where the balance was not good, the only possible explanation appears to be a change in the calorific value of the fish. Maintenance coefficients (energy required/g of fish/yr to maintain weight) fall within the range for other freshwater fish, and vary indirectly with the size of fish. The results are compared with those of other workers and with Winberg's (1956) predictions of metabolism. It is suggested that a more accurate estimate of metabolic rate would take account of feeding. The results of these experiments, the first in which all categories of energy flow were continuously measured in a growing fish, indicate that the majority of the as-

sumptions often made in energy studies are valid.--Copyright 1973, Biological Abstracts, Inc.
W74-02109

PAST AND CURRENT RESEARCH ON DISEASES OF EURASIAN WATERMILFOIL (MYRIOPHYLLUM SPICATUM L.),
Florida Univ., Gainesville. Dept. of Plant Pathology.
H. F. Hayslip, and F. W. Zettler.
Hyacinth Control Journal, Vol 11, p 38-40, June 1973. OWRR B-011-FLA (12). 14-31-0001-3268.

Descriptors: *Plant pathogens, *Aquatic plants, *Biocontrol, *Florida, *Aquatic weeds.
Identifiers: *Eurasian watermilfoil.

Eurasian watermilfoil (Myriophyllum spicatum L.) was first observed in Florida in the mid 1960's. Since then it has become a severe problem in several areas of Florida including the Crystal River, Deer Point Lake, and Lake Seminole. Other areas of the United States such as Currituck Sound in North Carolina and the Tennessee Valley have similar problems with Eurasian watermilfoil. In recent years, biocontrol agents have been given increasing consideration as a means of controlling this weed. Phytophagous insects have been reported on Eurasian watermilfoil but none are currently being used as biocontrols. Other phytophagous animals such as fish, manatees, and snails have also been investigated but their value as biocontrols of Eurasian watermilfoil remains to be determined. Unfortunately, relatively little attention has been given to pathogens of this plant despite the obvious potentials of viruses, fungi, bacteria, and nematodes as biocontrols. A search for phytopathogens as biocontrols of waterweeds, including Eurasian watermilfoil, was initiated at the University of Florida in 1970. Although several diseases of aquatic plants have been reported by workers on this project none has been reported on Eurasian watermilfoil. The progress of this program with respect to Eurasian watermilfoil is reported. (Morgan-Florida)
W74-02112

2J. Erosion and Sedimentation

EFFECT OF BENTHIC SEDIMENTS ON THE OXYGEN CYCLE IN PONDS, (IN RUSSIAN),
Akademiya Nauk Uzbekskoi SSR, Tashkent. Institut Zoologii i Parazitologii.
For primary bibliographic entry see Field 02H.
W74-01660

APPLICATION OF ERTS-1 MULTISPECTRAL IMAGERY TO MONITORING THE PRESENT EPISODE OF ACCELERATED EROSION IN SOUTHERN ARIZONA,
Geological Survey, Denver, Colo.
R. B. Morrison, and M. E. Cooley.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics Space and Admin Rept NASA SP-327, p 283-290, 1973. 5 fig.

Descriptors: *Remote sensing, *Satellites (Artificial), *Aerial photography, *Accelerated erosion, *Arizona, Mapping, Soil erosion, Surveys, Grasslands, Arid lands, Sheet erosion, Geomorphology, Terrain analysis, Gully erosion, Data collections.
Identifiers: ERTS.

An episode of accelerated arroy-cutting and sheet erosion commenced about 1890 in southern Arizona, following several thousand years of generally sluggish erosion. For a 17,000-square-mile study area, ERTS-1 images, supplemented by ultrahigh-altitide (U-2 and RB-57) airphotos, are proving effective for producing the first comprehensive maps showing the distribution and seriousness of the post-1890 erosion features, for monitoring new erosion changes, and for assessing the effectiveness of ameliorative measures. Such data are essential for understanind and controlling the accelerated erosion, a key environmental problem in this region. (See also W74-01663) (Knapp-USGS)
W74-01696

WAVE-INDUCED BOTTOM CURRENTS ON THE OUTER SHELF,
National Inst. of Oceanography, Wormley (England).
J. A. Ewing.
Marine Geology, Vol 15, No 2, p M31-M35, September 1973. 2 fig, 10 ref.

Descriptors: *Curents (water), *Waves (water), *Continental shelf, *Sediment transport, Storms, Ocean waves, Bottom sediments.

Estimates of the wave-induced oscillatory bottom currents available to move sediment on the continental shelf were made using the Pierson-Moskowitz wave spectrum; the oscillations are substantially stronger than had previously been thought. Near a shelf edge with canyons the wave-induced currents can be locally enhanced by wave refraction as much as about four times. Local sediment-transport rates will be greater and will occur more frequently than had previously been supposed. (Knapp-USGS)
W74-01719

PROVENANCES AND DISPERSAL PATTERNS OF TURBIDITE SAND IN ESCANABA TROUGH, NORTHEASTERN PACIFIC OCEAN,
Scripps Institution of Oceanography, La Jolla, Calif.
T. L. Vallier, P. J. Harold, and W. A. Girdley.
Marine Geology, Vol 15, No 2, p 67-87, September 1973. 7 fig, 5 tab, 43 ref.

Descriptors: *Bottom sediments, *Pacific Ocean, *Turbidity currents, *Sediment transport, Provenance, Sedimentation, Sedimentology, Sands.

Escanaba Trough, the median valley of Gorda Ridge in the northeastern Pacific, is partly filled with terrigenous sediment which was eroded mostly from rocks in the Klamath and Columbia River drainage basins and transported across the sea floor to the trough by turbidity currents. Basal or lower cores contain sand derived from the south-central metamorphic belt of the Klamath Mountains, whereas the upper cores have samd derived from the Columbia River drainage basin. Columbia River sediment reached Escanaba Trough either after a barier at Blanco Valley had been destroyed by tectonic movement or after a gradient, sufficient to maintain turbidity current momentum, had developed between the Astoria Fan apex and the trough. Sediment in Escanaba Trough is young and most probably was deposited when sea level was lower than at present, perhaps during the Wisconsin Glacial Age. (Knapp-USGS)
W74-01720

DYNAMICS AND THERMAL REGIMEN OF RIVER FLOWS (DINAMIKA I TERMIKA RECHNYKH POTOKOV).
Akademiya Nauk SSSR, Moscow. Institut Vodnykh Problem.
For primary bibliographic entry see Field 02E.
W74-01722

SUSPENDED-SEDIMENT BALANCE IN THE RYBINSK RESERVOIR (BALANS VZVESHENNYKH VESHCHESTV V RYBINSKOM VODOKHRANILISHCHE),
Akademiya Nauk SSSR, Moscow. Institut Biologii Vnutrennykh Vod.
For primary bibliographic entry see Field 05B.
W74-01729

SUSPENDED-SEDIMENT BALANCE IN THE UGLICH RESERVOIR (BALANS VZVESHENNYKH VESHCHESTV V UGLICHSKOM VODOKHRANILISHCHE),
Akademiya Nauk SSSR, Moscow. Institut Biologii Vnutrennykh Vod.
For primary bibliographic entry see Field 05B.
W74-01730

SEDIMENT-RETAINING CAPACITY OF THE UGLICH RESERVOIR (O NANOSOUDERZHIVAYUSHCHEY SPOSOBNOSTI UGLICHSKOGO VODOKHRANILISHCHA),
Akademiya Nauk SSSR, Moscow. Institut Biologii Vnutrennykh Vod.
V. P. Kurdin, and N. A. Ziminova.
In: Organicheskoye veshchestvo i elementy gidrologicheskogo rezhima volzhskikh vodokhranilishch; Akademiya Nauk SSSR Institut Biologii Vnutrennikh Vod Trudy, No 23 (26), p 221-225, Leningrad, 1972. 2 fig, 3 tab, 3 ref.

Descriptors: *Reservoirs, *Sedimentation, *Reservoir silting, *Deposition (Sediments), *Bottom sediments, Depth, Cross-sections, Curves.
Identifiers: *USSR (Uglich Reservoir).

The sediment-retaining capacity of the Uglich Reservoir for a 29-year period (1940-68) was calculated by methods of cross-sections and curves. The sediment-retaining capacity of the reservoir was 8,030,000 metric tons or 0.0123 cu km of deposited suspended sediment. A large portion of the sediment (3,202,000 metric tons) was deposited at depths greater than 9 m. The rate of silting of the reservoir increases from its upper reaches toward the gaging station of the Uglich works, reaching maximum values before the dam. Agreement in the results of computation of bottom-sediment deposition by these methods makes it possible to use them to calculate silt accumulations in reservoirs similar to the Uglich. (See also W74-01723) (Josefson-USGS)
W74-01731

PHOSPHORUS: ANALYSIS OF WATER, BIOMASS, AND SEDIMENT,
McMaster Univ., Hamilton (Ontario). Dept. of Geology.
For primary bibliographic entry see Field 05C.
W74-01800

CHANGES IN C, N, P, AND S IN THE LAST 140 YEARS IN THREE CORES FROM LAKES ONTARIO, ERIE, AND HURON,
Department of the Environment, Burlington (Ontario). Centre for Inland Waters.
For primary bibliographic entry see Field 05C.
W74-01805

EFFECTS OF SEDIMENT DIAGENESIS AND REGENERATION OF PHOSPHORUS WITH SPECIAL REFERENCE TO LAKES ERIE AND ONTARIO,
Department of the Environment, Burlington (Ontario). Centre for Inland Waters.
For primary bibliographic entry see Field 05C.
W74-01806

COARSE COMPONENTS IN SURFACE SEDIMENTS OF THE PANAMA BASIN, EASTERN EQUATORIAL PACIFIC,
Oregon State Univ., Corvallis. School of Oceanography.
R. O. Kowsmann.
Journal fo Geology, Vol 81, No 4, p 473-494, July 1973. 14 fig, 1 tab, 47 ref. ONR Contract N00014-67-A-0369-0007.

Descriptors: *Sedimentation, *Pacific Ocean, *Calcium carbonate, *Silica, *Aquatic microorganisms, Plankton, Provenance, Sediment distribution, Mineralogy.
Identifiers: *Panama Basin, *Biogenic sediments.

The abundance and distribution of biogenic, terrigenous, and volcanic particles in the Panama Basin are markedly dependent on bottom topography and dissolution of calcite in the deeper parts of the basin. Of the coarsé fraction, foraminiferal tests and acidic volcanic glass shards are concentrated on the Cocos and Carnegie Ridges as lag deposits. Foraminiferal fragments found on these ridge flanks and on the Malpelo Ridge are modified by the winnowing of bottom currents and by dissolution of calcite with increasing depth. The hydrodynamically light radiolarian skeletons are concentrated by bottom currents in the basin adjacent to the ridges. The foraminiferal calcite compensation depth in the basin is 3,400 micro. This relatively shallow depth is probably a consequence of the high biologic productivity in the cold, nutrient-rich surface waters over the basin. The pattern of productivity, however, is not reflected in the pattern of biogenic sediments. Acidic volcanic glass appears to have been carried into the basin from Costa Rica, Colombia, and Ecuador by easterly winds at altitudes of 1,500-6,000 micro. Basaltic shards from the Galapagos Island have been dispersed only over short distances to the west. Terrigenous sand-sized material is found on the edge of the continental shelf, where associated glauconite points to a relict origin, and along the northern Cocos Ridge, where contour currents may act as the dispersal mechanism. (Knapp-USGS)
W74-01877

BIOGENIC SEDIMENTS OF THE PANAMA BASIN,
Oregon State Univ., Corvallis. School of Oceanography.
T. C. Moore, Jr., G. R. Heath, and R. O. Kowsmann.
Journal of Geology, Vol 81, No 4, p 458-472, July 1973. 10 fig, 28 ref.

Descriptors: *Sedimentation, *Pacific Ocean, *Calcium carbonate, *Silica, *Aquatic microorganisms, Plankton, Provenance, Sediment distribution, Mineralogy.
Identifiers: *Panama Basin, *Biogenic sediments.

The Panama Basin is a miniature ocean basin in which the effect of variable rates of supply, dilution, dissolution, and lateral transport of biogenous sediments can be studied in detail. The rate of input inferred from rates of biologic productivity in surface waters does not resemble the distribution of either carbonate (foraminifera and calcareous nannofossils) or opal (diatoms and radiolaria) in sediments at the sea floor. The distribution of carbonate is primarily controlled by dissolution; at any depth, the rate is highest adjacent to the continent and decreases offshore in the more pelagic areas. The rate of dissolution increases rapidly with depth at about 1,500 micros. Winnowing and lateral transport from ridges into the basin is the second most important factor controlling the distribution of carbonate and the dominant factor governing the distribution of opal. In pelagic sediments of the western basin, about half the carbonate fraction appears to be derived from the surrounding ridges. Dilution of terrigenous material is important only in the eastern Panama Basin, where the concentration of opal is significantly reduced by fine-grained debris derived from Central America. (Knapp-USGS)
W74-01878

TEXTURE AND DISPERSAL OF SEDIMENTS IN THE PANAMA BASIN,
Oregon State Univ., Corvallis. School of Oceanography.
T. H. Van Andel.
Journal of Geology, Vol 81, No 4, p 434-457, July 1973. 18 fig, 2 tab, 18 ref.

Descriptors: *Sediment distribution, *Sediment transport, *Sediment sorting, *Pacific Ocean, Ocean currents, Provenance, Sampling, Particle size.
Identifiers: *Panama Basin.

The Panama Basin in the eastern equatorial Pacific is bordered by the continental margins of Central and South America and by the Cocos and Carnegie Ridges. A series of banks divides it into an eastern and a western basin. The distribution patterns of the sediments are the product of complex interactions between biological productivity, dissolution of calcite at depth, influx of continental debris, and dispersal and reworking of sediments by deep currents. The coarsest grain-size modes in the sand and soarse-silt range are concentrated on banks and ridges by winnowing, while the finer material is deposited on ridge slopes and in the western basin. Approximately one-half of the sediment in the deep western basin is the product of reworking. In contrast, the finest silt and clay modes have been dispersed by near-bottom currents and show transport of continental and fine biogenous material from the eastern to the western basin through gaps in the dividing ranges. (Knapp-USGS)
W74-01879

WATER RESOURCES DATA FOR TEXAS, 1971: PART 2. WATER QUALITY RECORDS.
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 07C.
W74-01885

CONCEPTUAL MODELS: 2. FLUVIAL-ALLUVIAL, GLACIAL, LACUSTRINE, DESERT, AND SHOREZONE (BAR-BEACH-DUNE-CHENIER) SEDIMENTARY ENVIRONMENTS,
Laurentian Univ., Sudbury (Ontario). Dept. of Geology.
K. H. Wolf.
Sedimentary Geology, Vol 9 , No 4, p 261-181, August 1973. 5 fig, 19 ref.

Descriptors: *Sedimentology, *Alluvial channels, *Lakes, *Deserts, *Beaches, *Shores, Sedimentation, Sediment transport, Coasts.

Conceptual models of five sedimentary environments are offered, of fluvial-alluvial, glacial, lacustrine, desert, and shorezone (bar-beach-dune-chenier) milieus. In the fluvial-alluvial model it is impossible to make a clear distinction between a source area, on the one hand, and a depositional area, on the other, because both erosion and accumulation of sediments can occur anywhere in the system. Glacial deposits range from ice-contact to glacio-fluvial, glacio-lacustrine, glacio-aeolian, and various types of glacio-marine deposits. All of these are transitional with each other and can be very complex. There is no simple lacustrine environment because the complex of sediments accumulate in a lacustrine basin with variable physical, chemical, biological, and geomorphologic conditions. The desert model resembles the lacustrine one as in both instances the sedimentary milieus can be the result of multiple geomorphologic combinations so that it is necessary to give a classification of the types of environments in addition to the various sedimentary parts that may be present. The desert model differs from most other models (except possibly the one on continental glaciation) in that it is directly dependent on global meteoritic factors in combination with global geographic factors. Several separate, local sedimentary environments have been combined in the shore zone model since the origin of bars, beaches, dunes, and chenier plains are genetically related. (Knapp-USGS)
W74-01940

SEVENTEEN-YEAR SEDIMENT PRODUCTION FROM A SEMIARID WATERSHED IN THE SOUTHWEST,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 04D.
W74-01948

DISTRIBUTION AND TRANSPORT OF SUSPENDED PARTICULATE MATTER IN HUENEME, REDONDO, NEWPORT, AND LA JOLLA SUBMARINE CANYONS, CALIFORNIA,
University of Southern California, Los Angeles. Dept. of Geological Sciences.
For primary bibliographic entry see Field 02L.
W74-01954

SUSPENDED SEDIMENT TRANSPORT ON THE NORTHERN OREGON CONTINENTAL SHELF,
Naval Academy, Annapolis, Md. Dept. of Environmental Sciences.
J. C. Harlett, and L. D. Kulm.
Geological Society of America Bulletin, Vol 84, No 12, p 3815-3826, December 1973. 11 fig, 24 ref. USGS 14-08-0001-11941, 12187, 12830 NOAA Sea Grant 2-35187.

Descriptors: *Sediment transport, *Suspended load, *Continental shelf, *Oregon, Currents (Water), Tides, Thermocline, Thermal stratification, Waves (Water), Littoral drift, Turbidity.

Bottom currents on the northern Oregon continental shelf have widely varying speeds with means near 10 cm per sec. Current direction is more constant but often is rotary. Generation may be due to internal and surface tides. Suspended material concentrates principally at the seasonal thermocline, at the permanent pycnocline, and at the bottom. Thickness and intensity of the bottom layer vary with both current strength and the amount of fine material in the surface sediment, whereas the intensity of the midwater layer appears to be related to the distance from the sediment source. The midwater layer also increases in vertical extent away from the shore. Seaward transport at the upper two surfaces provides a mechanism by which terrigenous sediment and biogenous material bypasses the outer continental shelf. (Knapp-USGS)
W74-01956

SCOURING OF BURIED PLEISTOCENE BARRIER COMPLEXES AS A SOURCE OF CHANNEL SAND IN TIDAL CREEKS, NORTH ISLAND QUADRANGLE, SOUTH CAROLINA,
South Carolina Univ., Columbia. Dept. of Geology.
E. Andrews, D. G. Stephens, and D. J. Colquhoun.
Geological Society of America Bulletin, Vol 84, No 11, p 3659-3662, November 1973. 4 fig, 8 ref.

Descriptors: *Sands, *Provenance, *Erosion, *Alluvium, *Tidal streams, *South Carolina, Alluvial channels, Deltas, Coastal marshes, Pleistocene epoch.

During the Pleistocene Epoch, a marine regression resulted in the deposition of a series of beach ridges on the continental shelf of South Carolina. With a rise in sea level, the ridges were inundated behind a landward-advancing Holocene barrier, and infilled by barrier and back-barrier environments. Subsequently, tidal creeks within the back-barrier environments have scoured the underlying Pleistocene deposits and incorporated these deposits with the Holocene sediment to form large sand bodies in an abb-tide direction at some meander bends. (Knapp-USGS)
W74-01960

OBSERVATIONS OF BEACH CUSPS AT MONO LAKE, CALIFORNIA,
Oregon State Univ., Corvallis. School of Oceanography.
P. D. Komar.
Geological Society of America Bulletin, Vol 84, No 11, p 3593-3600, November 1973. 4 fig, 1 tab, 21 ref. NSF Grant GA-36817.

Descriptors: Beaches, *Sedimentary structures, Sand waves, Erosion, Sediment transport, Sedimentation, Lakes, *California, Waves (Water).
Identifiers: *Mono Lake (Calif), *Beach cusps.

Beach cusps (uniformly spaced mounds or ridges of sediments that trend at right angles to the shoreline) are observed at Mono Lake, California. The cusps have spacings ranging from 11 to 59 cm, making them some of the smallest examples of natural beach cusps. They possess all the features observed in the much larger cusps found on ocean beaches: the same basic morphology, similar sediment sorting, and the same water circulation about the cusps. They form best when the lake is essentially smooth, when only surging, nonbreaking waves arrive at the shoreline. Edge waves, trapped by refraction to the nearshore, probably account for the cust formation and rhythmic spacing. (Knapp-USGS)
W74-01961

FACTORS GOVERNING CHANGES IN CHANNEL PROCESSES (FAKTORY, OPREDELYAYUSHCHIYE KHOD RUSLOVYKH PROTSESSOV),
All-Union Designing, Surveying and Scientific Research Inst. Hydroproject, Moscow (USSR).
I. A. Kuz'min.
Vodnyye Resursy, No 3, p 173-189, 1972. 4 ref.

Descriptors: *Channels, *Channel flow, *Channel morphology, *Channel erosion, *Deposition (Sediments), Sediment transport, Banks, Beds, Meanders, Flood plains, Discharge (Water), Geomorphology, Hydrology.
Identifiers: USSR, Tectonics.

The channel as the surface of contact between river flow and the streambed, and the relation of channel processes to adjacent geomorphological and hydrological processes are analyzed. Generally, channel deformations are the result of tectonic processes and the transport of sediment from higher to lower levels. Depending on direction of the channel process, deformations are classified as (1) deformations in regions of predominant erosion; (2) alternating, weakly expressed deformations in regions of sediment transport; and (3) deformations in regions of predominant aggradation. Deformations of the entire channel are expressed in local deformations, which have their own specific characteristics. Depending on channel structure, local channel processes are classified as (1) channel deformations in cohesive materials; (2) channel deformations in noncohesive materials; and (3) channel deformations in materials of complex structure. Local deformations are cyclic in character and are influenced by opposing tendencies. These cyclic local processes are classified as (1) meandering; (2) periodic widening; and (3) wandering. Depending on the character and scale of projects undertaken, the activities of man can produce channel deformations. (Josefson-USGS)
W74-01964

MEASUREMENT OF THE COMPLEX DYNAMIC RIGIDITY OF RECENT MARINE SEDIMENTS,
Naval Postgraduate School, Monterey, Calif.
For primary bibliographic entry see Field 02L.
W74-02146

2K. Chemical Processes

HIGH SENSITIVITY LASER ABSORPTION SPECTROSCOPY OF LABORATORY AQUEOUS SOLUTIONS AND OF NATURAL MISSOURI WATERS. A FEASIBILITY STUDY,
Missouri Univ., Kansas City. Dept. of Physics.
M. R. Querry, W. E. Holland, R. C. Waring, F. M. Hale, and M. D. Hermann.
Available from the National Technical Information Service as PB-225 431/6, $3.75 in paper copy, $1.45 in microfiche. Missouri Water Resources Research Center Completion Report, August 1973. 77 p, 8 fig, 8 ref, 3 append. OWRR A-058-MO (2). 14-31-0001-3825.

Descriptors: *Chlorophyll, *Spectroscopy, Absorption, Iron, Sulfates, *Missouri, Aqueous solutions, Non-destructive tests, Measurement.
Identifiers: *Laser enhanced adsorption, Spectroscopy.

Investigations have definitely shown that the quantity of both chlorophyll types a and b can be nondestructively measured in solution by use of laser enhanced absorption spectroscopy (LEAS) at 1/100 the concentration easily detectable by use of ordinary spectrophotometric methods; this is a 100 times increase in sensitivity. It is estimated that the ultimate sensitivity for the LEAS technique is 10,000 times greater than that for ordinary spectrophotometric methods.
W74-01658

INFRARED REFLECTANCE MEASUREMENTS OF MISSOURI WATERS FOR WATER QUALITY APPLICATIONS,
Missouri Univ., Kansas City. Dept. of Physics.
For primary bibliographic entry see Field 05A.
W74-01659

RATIO MAPS OF IRON ORE DEPOSITS, ATLANTIC CITY DISTRICT, WYOMING,
Environmental Research Inst. of Michigan, Ann Arbor.
For primary bibliographic entry see Field 07C.
W74-01705

USE OF ERTS-1 IMAGES IN THE SEARCH FOR PORPHYRY COPPER DEPOSITS IN PAKISTANI BALUCHISTAN,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W74-01706

SUMMARY GROUND-WATER RESOURCES OF CLARION COUNTY, PENNSYLVANIA,
Geological Survey, Harrisburg, Pa. Water Resources Div.
For primary bibliographic entry see Field 04B.
W74-01721

ORGANIC MATTER AND ELEMENTS IN THE HYDROLOGIC REGIMEN OF VOLGA RESERVOIRS (ORGANICHESKOYE VESHCHESTVO I ELEMENTY GIDROLOGICHESKOGO REZHIMA VOLZHSKIKH VODOKHRANILISHCH).
Akademiya Nauk SSSR, Moscow. Institut Biologii Vnutrennkh Vod.
For primary bibliographic entry see Field 05B.
W74-01723

ORGANIC MATTER IN WATER OF THE VOLGA RIVER AND ITS RESERVOIRS IN JUNE 1966 AND JULY 1969 (ORGANICHESKOYE VESHCHESTOVO V VODE VOLGI I YEYE VODOKHRANILISHCH V IYUNE 1966 G. I IYULE 1969 G.),
Akademiya Nauk SSR, Moscow. Institut Biologii Vnutrennkh Vod.
For primary bibliographic entry see Field 05B.
W74-01724

ORGANIC MATTER IN WATER OF LAKE ONEGA AND SOME WATER BODIES OF THE VOLGA-BALTIC WATERWAY IN THE SUMMER OF 1968 (ORGANICHESKOYE VESHCHESTVO V VODE ONEZHSKOGO OZERA I NEKOTORYKH VODOYEMOV VOLGO-BALTIYSKOGO VODNOGE PUTI LETOM 1968 G.),
Akademiya Nauk SSSR, Moscow. Institut Biologii Vnutrennkh Vod.
For primary bibliographic entry see Field 05B.
W74-01725

THE INFLUENCE OF A CHEMICAL PLANT SEWAGE SEDIMENTATION CATCHPIT ON GROUNDWATERS OF THE UPPER VISTULA FLOODPLAIN,
Academy of Mining and Metallurgy, Krakow (Poland). Inst. of Hydrogeology and Engineering Geology.
For primary bibliographic entry see Field 05B.
W74-01754

SPECTROPHOTOMETRIC DETERMINATION OF SOIL WATER CONTENT,
For primary bibliographic entry see Field 02G.
W74-01770

CHEMISTRY AND APPLICATION OF ORGANOPHOSPHORUS COMPOUNDS, PROCEEDINGS OF THIRD CONFERENCE.
For primary bibliographic entry see Field 05B.
W74-01787

CONJUGATION IN SYSTEMS WITH TETRAHEDRAL PHOSPHORUS,
Akademiya Nauk SSSR, Moscow. Inst. of Heteroorganic Compounds.
For primary bibliographic entry see Field 05B.
W74-01788

INVESTIGATIONS OF WATER SAMPLES FROM BROOKS, STREAMS, AND LAKES IN AREAS WITH DIFFERENT PARENT MATERIAL,
Norges Landbrukshoegskole, Vollebekk.
A. Oien.
Meld Nor Landbrukshogsk, Vol 50, No 19, p 1-9, 1971, Illus, English summary.
Identifiers: Brooks, Lakes, *Norway (Nordmarka), Streams, Water samples, *Sampling, *Electrolytes, *Minerals.

The electrolytes in water samples from brooks, streams, and lakes in Nordmarka north of Oslo, and from a lake, Arungen in As (Norway) were investigated. The areas in Nordmarka are covered with autochthonous morainic material, poor in clay. The amounts of dissolved minerals due to igneous Permian rocks, granite, syenite, and monzonite, were small, while water samples from a Cambro-Siourian area contained relatively great amounts of dissolved minerals. The concentrations of electrolytes were proportional to the electrical conductance, and pH also increased with increasing conductance. The variation in the Ca/Mg proportion was relatively small, except in water samples from the Cambro-Silurian area, where it was very high. The content of K was low in comparison with that of Na. The content of electrolytes of the water samples was approximately the same as that of lakes in areas with corresponding parent material. Water samples high in Fe and Mn also contained unusually high amounts of or-

ganic material. The phosphate content was less than 0.03 mg P/l. Water from an eutrophic lake, Arungen, contained considerably more, 0.11 mg/l. The high content of alkali metals and phosphate in Arungen is also an indication of pollution. Sampling was usually repeated in the different localities. The variation in the ionic concentrations was relatively small. This is indicative of an equilibrium between the mineral particles and the ions in the water. The differences in the ionic concentration in the samples from brooks, streams, and lakes in the area surrounding Gjerdingen and Gjerdingselva, are relatively small.--Copyright 1973, Biological Abstracts, Inc.
W74-01817

BIOGENIC SEDIMENTS OF THE PANAMA BASIN,
Oregon State Univ., Corvallis. School of Oceanography.
For primary bibliographic entry see Field 02J.
W74-01878

WATER QUALITY IN THE CONSERVATION AREAS OF THE CENTRAL AND SOUTHERN FLORIDA FLOOD CONTROL DISTRICT, 1970--72,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 05B.
W74-01881

WATER RESOURCES DATA FOR TEXAS, 1971: PART 2. WATER QUALITY RECORDS.
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 07C.
W74-01885

AVAILABILITY OF PHOSPHORUS AND NITROGEN IN ACID SOIL IN PRESENCE OF CALCIUM SALTS,
Allahabad Univ. (India). Dept. of Chemistry.
For primary bibliographic entry see Field 02G.
W74-01896

THE SUBSIDENCE OF THE SURFACE BETWEEN MOGOTES IN PURETO RICO EAST OF ARECIBO,
Technische Universitaet, Hanover (West Germany). Geographisches Institut.
For primary bibliographic entry see Field 02F.
W74-01912

WATER RESOURCES OF THE RUSTON AREA, LOUISIANA,
Geological Survey, Baton Rouge, La.
For primary bibliographic entry see Field 04B.
W74-01921

MEASUREMENTS PROGRAM FOR OIL-SLICK CHARACTERISTICS--FINAL REPORT,
Michigan Univ., Ann Arbor. Willow Run Labs.
For primary bibliographic entry see Field 05B.
W74-01941

INVESTIGATION OF RELIEF WELLS, MISSISSIPPI RIVER LEVEES, ALTON TO GALE, ILLINOIS,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Soils and Pavements Lab.
For primary bibliographic entry see Field 04B.
W74-01942

MATHEMATICAL SIMULATION OF SALINITY IN THE SACRAMENTO ROVER SYSTEM,
California State Dept. of Water Resources, Sacramento.
For primary bibliographic entry see Field 05B.
W74-01944

ACHIEVEMENTS AND IMMEDIATE TASKS OF HYDROCHEMISTRY ON THE FIFTIETH ANNIVERSARY OF THE FOUNDING OF THE USSR (DOSTIZHENIYA GIDROKHIMII ZA 50 LET SUSHCHESTVOVANIYA SSSR I YEYE BLIZHAYSHIYE ZADACHI),
Akademiya Nauk SSSR, Leningrad. Institut Ozerovedeniya.
O. A. Alekin.
Vodnyye Resursy, No 3, p 25-32, 1972.

Descriptors: *Water chemistry, *Water quality, Water quality control, Water pollution control, Self-purification, Water types.
Identifiers: *USSR.

Main stages in the development of hydrochemistry as a science, and successes attained in this field are discussed. Hydrochemistry is examined as a scientific discipline concerned with the chemical composition of all natural waters (hydrosphere) and not of surface waters alone. Of all types of natural waters, the least studied is the composition of atmospheric precipitation. A fundamental problem of hydrochemistry is that of studying environmental effects on water quality and of establishing quantitative relations. The role of hydrochemistry in water quality control is noted, and important tasks of hydrochemistry are outlined. (Josefson-USGS)
W74-01969

GROUND-WATER RESOURCES OF KLEBERG, KENEDY, AND SOUTHERN JIM WELLS COUNTIES, TEXAS,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 04B.
W74-02138

WATER-QUALITY RECORDS FOR SELECTED RESERVOIRS IN TEXAS, 1970-71 WATER YEARS,
Geological Survey, Austin, Tex.
J. Rawson, H. L. Kunze, and H. J. Davidson.
Texas Water Development Board Report 177, September 1973. 102 p, 10 fig, 37 tab, 9 ref.

Descriptors: *Water quality, *Water analysis, *Chemical analysis, *Reservoirs, *Texas, Basic data collections, Lakes, Water chemistry, Sampling, Sites, Maps, Water temperature.

Periodically since 1961, the U.S. Geological Survey, in cooperation with State, Federal, and local agencies, has made comprehensive water-quality surveys of selected reservoirs in Texas. During the 1970 water year, the program was expanded to include periodic sampling of many other reservoirs in the State where surveys were not being made. The results of water-quality surveys of nine reservoirs and the results of chemical analyses of water samples collected periodically from 55 other reservoirs are presented. (Woodard-USGS)
W74-02139

GROUNDWATER RESOURCES OF BLANCO COUNTY, TEXAS,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 04B.
W74-02141

2L. Estuaries

WAVE-INDUCED BOTTOM CURRENTS ON THE OUTER SHELF,
National Inst. of Oceanography, Wormley (England).
For primary bibliographic entry see Field 02J.
W74-01719

PROVENANCES AND DISPERSAL PATTERNS OF TURBIDITE SAND IN ESCANABA TROUGH, NORTHEASTERN PACIFIC OCEAN,
Scripps Institution of Oceanography, La Jolla, Calif.
For primary bibliographic entry see Field 02J.
W74-01720

TOXICITY OF POWER PLANT CHEMICALS TO AQUATIC LIFE.
Battelle-Pacific Northwest Labs., Richland Wash.
For primary bibliographic entry see Field 05C.
W74-01732

SPARTINA ALTERNIFLORA (TALL) PRODUCTIVITY IN A POLLUTED NEW JERSEY ESTUARY,
Lehigh Univ., Bethlehem, Pa. Dept. of Biology.
For primary bibliographic entry see Field 05C.
W74-01738

TOXICITY OF TWENTY-THREE INSECTICIDES TO A TUBIFICID WORM BRANCHIURA SOWERBYI FROM THE MISSISSIPPI DELTA,
Mississippi State Univ., State College. Dept. of Zoology.
For primary bibliographic entry see Field 05C.
W74-01740

DISSOLVED POLLUTION PRODUCT GASES IN NATURAL WATERS,
Maine Univ., Walpole. Dept. of Oceanography.
For primary bibliographic entry see Field 05B.
W74-01786

ECONOMICS OF MARINE RESOURCES DECISION MODEL,
California Univ., Santa Barbara. Marine Sciences Inst.
For primary bibliographic entry see Field 06A.
W74-01837

EVALUATION OF WATER PENETRATION PHOTOGRAPHY FOR BOTTOM SEDIMENT MAPPING IN LITTLE HARBOR, CATALINA ISLAND,
Geosource International Inc., Seal Beach, Calif. Geoscience Div.
For primary bibliographic entry see Field 07B.
W74-01949

DISTRIBUTION AND TRANSPORT OF SUSPENDED PARTICULATE MATTER IN HUENEME, REDONDO, NEWPORT, AND LA JOLLA SUBMARINE CANYONS, CALIFORNIA,
University of Southern California, Los Angeles. Dept. of Geological Sciences.
D. E. Drake, and D. S. Gorsline.
Geological Society of America Bulletin, Vol 84, No 12, p 3949-3968, December 1973. 12 fig, 1 tab, 44 ref. NSF Grant GA-22842.

Descriptors: *Submarine canyons, *Turbidity currents, Continental shelf, *California, Turbidity, Suspended load, Currents (Water), Density stratification, Sea water.

Studies of the distribution of suspended particulate matter in the waters over Hueneme, Redondo, Newport, and La Jolla submarine canyons off southern California were combined with analyses of recordings of canyon-floor currents to evaluate the influence of canyons on the seaward dispersal of fine, terrigenous sediment. Suspended sediment concentrations and composition over the mainland shelf in fall and winter are controlled principally by terrigenous-sediment supply. Consequently, particle concentrations at all levels generally increased toward the coast. The vertical distribution

of suspended particulate matter was influenced strongly by the density structure of the water column on the shelf and slope, and sharply bounded, midwater, turbidity maxima were well developed over the shelf where sediment supply is comparatively large. Nepheloid layers were present and ranged from a few meters to greater than 200 m in thickness with peak particle concentrations of 5 to 7 mg per liter over the inner shelf and within the steep-walled, headward portions of each canyon. The slow, net downcanyon water transport may be explained in part by the mechanism of turbid-layer flow. (Knapp-USGS)
W74-01954

ECOLOGY OF SALT MARSHES AND SAND DUNES,
D. S. Ranwell.
Chapman and Hall: London, England; Halsted Press, a division of John Wiley and Sons, Inc.: New York, N.Y., 1972. 258 p. Illus. Maps. Pr $14.50.
Identifiers: Books, Climate, *Ecology, Human influences, Resources, *Salt marshes, *Sand dunes, Soils, Wildlife.

The salt marsh and sand dune habitats and the ecological processes operating within them are compared. The book is divided into 4 major sections. The first part, general relationships, discusses climatic restraints, physiography and hydrology and mineral nutrient relations. Part 2, salt marshes, discusses tidal influence; sedimentation, drainage and soil physical development; species strategies; and structure and function of communities. Part 3, sand dunes, covers formation and differentiation of the habitat; sand, water relations and processes of soil formation; structure and function of dune communities; and structure and function of slack communities. The final section, human influences, covers management of salt marshes wildlife resources and management of sand dune wildlife resources. A comprehensive bibliography includes 400 references.--Copyright 1973, Biological Abstracts, Inc.
W74-01984

A NEW RECORD OF THE BOWFIN, AMIA CALVA LINNAEUS, IN THE UPPER CHESAPEAKE BAY,
Edgewood Arsenal, Md. Biomedical Lab.
J. G. Pearson, and F. P. Ward.
Chesapeake Sci. Vol 13, No 4, p 323-324. 1972. Illus.
Identifiers: Amia-calva, Bays, *Bowfin, *Chesapeake Bay, *Maryland (Gunpowder River), Estuaries.

Five adult bowfin, A. calva, were gill-netted in the Gunpowder River estuary of the upper Chesapeake Bay, in Jan., Feb. and March of 1972. These are the first records of the species in the area. Various counts and measurements of the specimens agreed with previous descriptions. The fish probably washed into tributaries of the Gunpowder River from stock ponds that overflowed following extremely heavy rains on 1 Aug. 1971. Approximately 600-700 adult bowfin apparently escaped. At least some of the fish were able to tolerate the estuarine conditions; however, only successful reproduction will determine whether or not the fish becomes established in the area.--Copyright 1973, Biological Abstracts, Inc.
W74-01986

ENERGY REQUIREMENTS AND FOOD SUPPLIES OF CTENOPHORES AND JELLYFISH IN THE PATUXENT RIVER ESTUARY,
Fisheries Research Board of Canada, St. John's. (Newfoundland). Biological Station.
R. J. Miller, and R. B. Williams.
Chesapeake Sci. Vol 13, No 4, p 328-331. 1972.
Identifiers: *Ctenophores, Energy, *Estuary, Food, *Jellyfish, *Maryland (Patuxent River), Phytoplankton, Rivers, Zooplankton.

Interpretation of published data for the Patuxent River, Maryland, indicates that for most of the year the total biomass of phytoplankton and zooplankton was inadequate to meet the minimum energy needs of ctenophores and jellyfish.--Copyright 1973, Biological Abstracts, Inc.
W74-01991

UREA AND OTHER NITROGENOUS NUTRIENTS IN LA JOLLA BAY DURING FEBRUARY, MARCH AND APRIL 1970,
Johns Hopkins Univ., Baltimore, Md. Chesapeake Bay Inst.
For primary bibliographic entry see Field 05B.
W74-01993

AQUATIC AND ATMOSPHERIC SIMULATION,
California Univ., Livermore. Lawrence Livermore Lab.
For primary bibliographic entry see Field 05B.
W74-02003

EFFECTS OF OCEAN WATER ON THE SOLUBLE-SUSPENDED DISTRIBUTION OF COLUMBIA RIVER RADIONUCLIDES,
Oregon State Univ., Corvallis.
For primary bibliographic entry see Field 05C.
W74-02012

STABLE MANGANESE AND MANGANESE-54 DISTRIBUTIONS IN THE PHYSICAL AND BIOLOGICAL COMPONENTS OF THE HUDSON RIVER ESTUARY,
New York Univ. Medical Center, N.Y.
For primary bibliographic entry see Field 05B.
W74-02048

ACCUMULATION OF SOLUBLE AND PARTICULATE RADIONUCLIDES BY ESTUARINE FISH,
National Marine Fisheries Service, Beaufort, N.C.
For primary bibliographic entry see Field 05B.
W74-02049

BIOLOGICAL AND CHEMICAL STUDY OF VIRGINIA'S ESTUARIES,
Virginia Electric and Power Co., Richmond.
For primary bibliographic entry see Field 05B.
W74-02052

THE MARSHES OF MISSISSIPPI,
Gulf Coast Research Lab., Ocean Springs, Miss.
L. N. Eleuterius.
Castanea. Vol 37, No 3, p 153-168, 1972, Illus.
Identifiers: Estuaries, *Marshes, *Mississippi, *Salinity gradient, *Vascular plants.

Mississippi marshes were sampled during 1968 and 1969 by line transect and list count quadrats and the composition of vascular plants throughout the salinity gradient was determined in 3 estuarine systems. Profile diagrams were prepared to illustrate lateral zonation of the plant communities. Marsh acreage, measured by planimeter from survey maps, was determined. Organic production of the vascular marsh plants in Mississippi was estimated. Present and projected man-made changes in the marshes are discussed. Some observations on composition and zonation of plant colonization on spoilbanks and landfills are presented.--Copyright 1973, Biological Abstracts, Inc.
W74-02081

A TEN-YEAR STUDY OF MEROPLANKTON IN NORTH CAROLINA ESTUARIES: MYSID SHRIMPS,
National Marine Fisheries Service, Washington, D.C. Systematics Lab.
A. B. Williams.
Chesapeake Sci. Vol 13, No 4, p 254-262. 1972. Illus.
Identifiers: Bowmaniella-Dissimilis, Bowmaniella-Johnsoni, *Estuaries, Heteromysis-Formosa, Metamysidopsis-Mexicana, Mysidopsis-Bigelowi, Neomysis-Americana, *North Carolina, Plankton, Promysis-Atlantica, Year, *Meroplankton, *Mysid shrimps.

Seven species of mysid shrimps taken in semiquantitative, nocturnal, surface plankton samples showed variable levels of abundance and frequency of occurrence from stations near the sea to the head of estuaries in North Carolina. Bowmaniella dissimilis occurred mainly in samples from stations near the sea in every month of the year, and reached its greatest abundance from spring through autumn coincident with its breeding season. B. johnsoni was taken at stations near the sea only twice. Mysidopsis bigelowi, the second most abundant species, occurred in samples from every station, and was in breeding condition throughout the estuaries from late winter to mid-autumn. Metamysidopsis mexicana occurred spradically in samples from 3 stations near inlets, was in breeding condition throughout the year, but appeared to be most abundant in summer and fall. Promysis atlantica appeared infrequently at stations near inlets in all months except Feb. and March, usually in breeding condition. Neomysis americana was the most abundant species, reaching its greatest concentration in samples from middle to upper estuarine stations where spawners were almost always present. Size differentials suggested more than a single generation per year. The species showed no evidence of nocturnal stratification in the shallow 6-m deep estuarine water. Heteromysis formosa occurred sporadically from May-Dec.--Copyright 1973, Biological Abstracts, Inc.
W74-02094

MEASUREMENT OF THE COMPLEX DYNAMIC RIGIDITY OF RECENT MARINE SEDIMENTS,
Naval Postgraduate School, Monterey, Calif.
G. A. Engel.
Available from NTIS, Springfield, Va 22151 AD-758 678 Price $3.00 printed copy; $1.45. M Sc Thesis, December 1972. 78 p, 32 fig, 9 tab, 18 ref.

Descriptors: *Sedimentology, *Sediments, *Continental shelf, *Marine geology, Sampling, Rigidity, Testing procedures, Physical properties, Density, Porosity, Particle size, Shear strength, Computer programs, Correlation analysis, Viscometers, Viscosity.

The dynamic rigidity of 17 samples of continental terrace clayeysilt sediments was measured in the laboratory using viscoelastometer in the frequency range of 7 to 60 kHz. The method involved the progagation of torsional waves on a rod and measuring the effects of shear loading imparted to the rod when imbedded in a sediment. Values of the real component of rigidity ranged from 1,600,000 dynes/sq cm to 21,000,000 dynes/sq cm. Values of the imaginary component of rigidity ranged from 200,000 dynes/sq com to 41,000,000 dynes/sq com. No clear-cut dependence of rigidity upon frequency was observed. Both real and imaginary components of rigidity were analyzed by plotting the data as a function of various other mass-physical properties including: density, porosity, compresional wave speed, sand-silt-clay percentages, vane shear strength, and the product of density and sound speed squared. These analyses substantiate research done by other workers indicating that both real and imaginary components of rigidity exhibit trends with some of the mass-physical properties. (Woodard-USGS)
W74-02146

03. WATER SUPPLY AUGMENTATION AND CONSERVATION

3A. Saline Water Conversion

THE REMOVAL OF TOXIC METALS FROM WATER BY REVERSE OSMOSIS,
Research Triangle Inst., Durham, N.C.
For primary bibliographic entry see Field 05D.
W74-01906

HOLLOW FINE FIBERS FOR BRACKISH WATERS SOFTENING,
Monsanto Research Corp., Durham, N.C.
R. L. Leonard, and T. A. Orofino.
Available from the National Technical Information Service as PB-223 384, $4.50 in paper copy, $1.45 in microfiche. Office of Saline Water Research and Development Progress Report No 887, September 1973. 39 p, 5 fig, 17 tab, 4 ref. OSW Contract 14-30-2872.

Descriptors: *Membrane processes, Desalination processes, *Desalination, *Reverse osmosis, Water treatment, *Water softening, Pilot plants, *Brackish water.
Identifiers: Hollow fine fiber modules, Cellulose acetate membranes.

Basic procedures developed previously in spinning of high-flux, asymmetric hollow fibers from cellulose acetate were modified to yield systems especially suited for low pressure water softening. Use of alternate solvents, coagulation media, and annealing conditions provided hollow fibers varying in monvalent/divalent salt passage ratio and with markedly improved product water flux as compared with state-of-the-art systems. Laboratory performance of a hollow fiber system especially useful for divalent ion rejection exceeded 10 gfd and 95% rejection of magnesium sulfate at 150 psi, after seven days of uninterrupted test. Several modules, up to 1500 gpd capacity, were fabricated from standard and improved fibers and placed in low-pressure service at OSW field sites. (OSW)
W74-01907

CONTROL OF FOULING OF REVERSE OSMOSIS MEMBRANES WHEN OPERATING ON POLLUTED SURFACE WATERS,
Gulf Environmental Systems Co., San Diego, Calif.
J. E. Beckman, E. Bevege, J. E. Cruver, S. S. Kremen, and I. Nusbaum.
Available from the National Technical Information Service as PB-223 181, $10.00 in paper copy, $1.45 in microfiche. Office of Saline Water Research and Development Progress Report No. 882, September 1973. 145 p, 65 fig, 15 tab, 7 ref. OSW Contract 14-01-0001-2225.

Descriptors: *Desalination, *Descaling, *Membranes, Pilot plants, *Reverse osmosis, Waste water treatment, Pollution abatement.
Identifiers: *Fouling, Sewage, Chemical cleaners, Spiral would modules.

The purpose was to study the reverse osmosis membranes fouling characteristics of sewage-contaminated surface waters and to develop techniques for prevention and/or cleaning. Laboratory experiments were conducted to characterize sewage-contaminated surface waters and to screen various feed additives. Field tests were run at the Santee Water Reclamation Facility with 3.5 ft2 spiral membrane modules to determine the effects of operating variables such as brine velocity, pressure, brine-to-product flow ratio, and brine channel turbulence. Samples of membranes from these tests were used for laboratory screening of chemical cleaners. Several cleaning techniques were successful for the fouled modules. Sodium perborate, 'Biz' enzyme detergent, and ethylene diamine tetra acetic acid restored the product water flux to 80 to 85% of the initial value (compaction alone has accounted for a 15% flux decline in a previous 200-hr test). In the final stage of the program, the cleaning techniques were tested in the field and compared on the basis of their abilities to maintain product water flux. All three cleaners performed well. The program was concluded with an 1100-hr run at Santee which had a log-log flux decline slope of -0.076 with sodium borate cleaning. A simplified economic analysis indicated that, at the longer-term test conditions, the cleaning cost would be minimal (24 cent/1000 gal.). (OSW)
W74-01908

SEA WATER PILOT PLANT CONSTRUCTION AND OPERATION,
Envirogenics Co., El Monte, Calif.
S. C. May, and R. A. Tidball.
Available from the National Technical Information Service as PB-223 192, $6.00 in paper copy, $1.45 in microfiche. Office of Saline Water Research and Development Progress Report 878, September 1973. 67 p, 19 fig, 6 tab. OSW Contract 14-30-2871.

Descriptors: *Desalination, Desalination processes, *Reverse osmosis, *Membrane processes, Desalination plants, *Pilot plants, Sea water, Pretreatment, *California.
Identifiers: Tubular modules, Cellulose acetate blend membranes, San Diego (Calif), Polycarbonate return bends.

The construction and operation of a first pass sea water reverse osmosis tubular assembly (as used in a two pass system) and the desalting performance evaluation of cellulose acetate blend membranes under actual field service conditions are described. The system is composed of 1240 tubular elements connected with polycarbonate return bends operating at 1000 psi on pretreated seawater. Membrane performance was satisfactory with an initial flux of 16 gfd and a product salinity of 2000 ppm. A flux decline coefficient of 0.02 was measured for the initial testing period. After initial system check-out, the full complement of 1240 tubes was installed in January 1972 and operated at the OSW San Diego Sea Water Test Facility until April 30, 1972. With this full complement of tubes, a system on-stream factor of 79% was obtained. Recommendations were made for system design changes to improve this to over 90% with primary emphasis on changes to the high pressure pump piping system. (OSW)
W74-01909

DEVELOPMENT OF SECOND GENERATION SPIRAL MEMBRANE REVERSE OSMOSIS ELEMENTS,
Gulf Environmental Systems Co., San Diego, Calif.
G. E. Foreman, S. S. Kremen, W. W. Wight, and T. D. Wolfe.
Available from the National Technical Information Service as PB-223 191, $3.75 in paper copy, $1.45 in microfiche. Office of Saline Water Research and Development Progress Report 875, September 1973. 95 p, 41 fig, 21 tab, 6 ref. OSW Contract 14-30-2859.

Descriptors: *Desalination, Desalination processes, *Desalination apparatus, *Reverse osmosis, *Membrane processes, Desalination plants, Pilot plants, Brackish water.
Identifiers: Spiral wound modules, Low pressure, Cellulose acetate membranes, Brine spacer materials.

Development and demonstration of a second generation spiral-would reverse osmosis element were successfully undertaken. The element developed is a nominal 12 inches in diameter, 36 inches long and contains in excess of 550 ft2 of active membrane area. The element contains 20 leaves that are attached together and to the product tube in a novel tributary configuration. While desalting a brackish feedwater at 400 psi, the membrane in the element produces more than 16 gal/ft2-day of purified water while rejecting over 94% of the sodium chloride. Two of these elements were tested on a natural feedwater for 200 and 650 hours. Techniques to reuse expensive components in the element and to restore adequate salt rejection by in-situ reheat treatment of the membrane were also investigated. A low cost filter paper was found that can be used as a replacement for one-half of the woven polyester sailcloth support presently used in the element. Brine spacer materials were also re-evaluated to find a suitable and thinner replacement for the presently used 0.040-in. polymer netting. This resulted in prototypes of a new material that is 0.028 inches thick with apparent performance equal to that of the thicker material. (OSW)
W74-01910

CONCEPTUAL DESIGN OF HOLLOW FINE FIBER SEAWATER REVERSE OSMOSIS DESALTING PILOT PLANT,
Dow Chemical Co., Freeport, Tex.
B. P. Shephard, H. C. Behrens, J. R. Massie, Jr., and W. F. McIlhenny.
Available from the National Technical Information Service as PB-223 267 $10.75 in paper copy, $1.45 in microfiche. Office of Saline Water Research and Development Progress Report No 873, September 1973. 164 p, 28 fig. OSW Contract 14-30-3113.

Descriptors: *Desalination, Desalination processes, *Reverse osmosis, *Membrane processes, Desalination plants, *Pilot plants, *Sea water, Pretreatment.
Identifiers: Hollow fine fiber modules, Cellulose Triacetate Membranes, Conceptual design.

An engineering study was made to determine the optimum minimum size pilot plant to provide useful scale-up data for hollow fine fiber reverse osmosis seawater desalting plants in the 0.5 to 1.0 mgd range. A conceptual design based on reverse osmosis modules of 2500 gpd capacity, a cost estimate and a construction schedule were developed. A test agenda and time schedule for testing were also formulated. The study showed that (1) The optimum minimum size pilot plant is 50,000 gpd of product water. At 25 percent recovery, a seawater feed of 140 gpm is required. (2) Major test areas are marine fouling control, filtration, residual iron control and removal, high pressure piping, reverse osmosis and materials of construction. (3) The estimated cost of engineering and constructing the pilot plant for the single sand filter configuration is $194,000 and for the dual sand filter $208,000. (4) Engineering, procurement and construction will require ten months, and the test agenda 13 months, with a one-month overlap. (OSW)
W74-01911

TESTING REVERSE OSMOSIS MODULES FOR WASHWATER RECYCLING,
Abcor, Inc. Cambridge, Mass.
For primary bibliographic entry see Field 05D.
W74-01924

INTERACTION OF FEEDWATER COLLOIDS WITH THE SURFACE OF REVERSE OSMOSIS MEMBRANES,
Gulf Environmental Systems Co., San Diego, Calif.
For primary bibliographic entry see Field 05D.
W74-01925

CALCIUM SULFATE SCALE CONTROL IN HIGH TEMPERATURE DESALTING PROCESSES,
California Univ., Los Angeles.
J. Glater, R. L. Dooly, and J. W. McCutchan.
Available from the National Technical Information Service as PB-223 386, $6.00 in paper copy, $1.45 in microfiche. Office of Saline Water Research and Development Progress Report 888, August 1973. 69 p, 9 tab, 19 fig, 27 ref. OSW Contract 14-30-2785.

Descriptors: *Distillation, *Calcium sulfate, *Gypsum, *Anhydrite, *Scaling, *Desalination, Sea water.
Identifiers: Hemihydrate, Magnesium sulfate, Magnesium ion, *Scale control.

Work reported shows excellent scaling threshold improvement in natural sea water concentrates enriched with magnesium chloride. Scaling thresholds of calcium sulfate hemihydrate and anhydrite were evaluated from solubility measurements under equilibrium conditions in natural sea water concentrates over a temperature range between 225 and 340F. These forms of calcium sulfate were chosen as solid phases since both scale modifications may be anticipated in distillation processes at high temperatures. Natural sea water from Marineland, California, was selected for this study because of it clarity and constancy of composition--showing insignificant variation with tide, sea temperature, or season. Calcium and magnesium analysis over a period of years gave average values of 393 ppm and 1297 ppm, respectively. (OSW)
W74-01926

THE WRIGHTSVILLE BEACH, NORTH CAROLINA, PILOT PLANT TESTING PROGRAM TO EVALUATE SEA WATER PRETREATMENT METHODS FOR REVERSE OSMOSIS PLANTS,
Stone (Ralph) and Co., Inc., Los Angeles, Calif.

Available from the National Technical Information Service as PB-223 582 $4.25 in paper copy; $1.45 in microfiche. Office of Saline Water Research and Development Program Report 891, September 1973. 79 p, 25 fig, 16 tab. OSW Contract 14-30-2833.

Descriptors: Desalination, *Desalination Plants, Desalination Processes, *Membrane Processes, *Pilot Plants, *Reverse Osmosis, *Sea Water, Chlorine, Sands, Diatomaceous earth, *Filtration, Waste water treatment.
Identifiers: *Pretreatment (Water), Manganese Zeolite, Astwated Carbon.

A pilot plant investigation at the OSW Wrightsville Beach Test Facility evaluated the effectiveness of five pretreatment systems in improving the quality of sea water prior to reverse osmosis. Two identical filtration trains provided data for the following pretreatment systems: chlorination; rapid sand; manganese zeolite; and activated charcoal filtration. These were used in different combinations to obtain optimum treatment. Results are presented in tabular form by parameter, average influent, and average effluent. Other general information on adverse raw sea water quality indicates that high levels of suspended solids and organics may occur during the summer and fall, as well as during storms. Throughout the April-June 1972 test period the raw sea water was clear. (OSW)
W74-01931

THE CHULA VISTA, CALIFORNIA, PILOT PLANT TESTING PROGRAM TO EVALUATE SEA WATER PRETREATMENT METHODS FOR REVERSE OSMOSIS,
Stone (Ralph) and Co., Inc., Los Angeles, Calif.

Available from the National Technical Information Service as PB-223 594 $4.25 in paper copy; $1.45 in microfiche. Office of Saline Water Research and Development Program Report 890, September 1973. 111 p, 23 fig, 20 tab, 14 ref. OSW Contract 14-30-2833.

Descriptors: Desalination, *Desalination Plants, Desalination Processes, *Membrane Processes, *Reverse Osmosis, *Sea Water, *Pilot plants, *Filtration, Chlorination, Coagulation, Waste water treatment.
Identifiers: Sand Filtration, Activated Carbon Filtration, Diotomaceous Earth Filtration, Alum Coagulation, *Pretreatment methods.

The study investigated sea water pretreatment methods which could be used in conjunction with reverse osmosis desalination to prolong membrane effectiveness. The investigation consisted of: (1) Bench-scale tests to determine optimum application of coagulants, chlorine and possible need for pH adjustments; (2) Pilot plant test to determine the effect of hydraulic loading; (3) Pilot plant test to determine the effects of chlorination, alum coagulation, settling, sand, manganese-zeolite, granular activated carbon and diatomaceous earth pressure filters; and (4) a two-week continuous run to determine the performance of the above mentioned filters under prolonged operation. The study showed that chlorination, sand pressure filtration and activated carbon filtration were sufficient to obtain the desired water quality of less than 1 JTU turbidity at all times during the test period. The bench-scale tests indicated that alum coagulation and settling provide satisfactory clarification. (OSW)
W74-01932

DEVELOPMENT OF POLYAMIDE MEMBRANES FOR SEA WATER DESALINATION,
Chemstrand Research Center, Inc., Durham, N.C.
R. McKinney, Jr., W. L. Hofferbert, and J. A. Carden.
Available from the National Technical Information Service as PB-223 385 $3.25 in paper copy, $1.45 in microfiche. Office of Saline Water Research and Development Program Report 886, September 1973. 18 p, 4 fig, 7 tab, 2 ref. OSW Contract 14-30-2868.

Descriptors: *Desalination, Desalination Processes, *Membrane Processes, *Reverse Osmosis, *Sea water.
Identifiers: *Aromatic polyamides, Ionic cross-linking, Tubular Membranes.

The use of cross-linking based on ionic bonds has been successfully employed in membranes prepared from aromatic polyamides for the improvement of long-term flux stability. Typical flux and compaction rate performance ranged for the ionically cross-linked flat films operating at 1500 psi with sea water are: J1 (gfd); d log J1/d log t 14.2; -0.09 to 10.2; -0.02 at a sodium chloride rejection of 99.4%. Preliminary data taken for seamless tubular membranes indicate a performance level of 7 gfd and 99.3% rejection at a compaction rate of -0.03 under comparable conditions of reverse osmosis. (OSW)
W74-01933

BRACKISH WATER DESALTING TESTING AND EVALUATION PROCEDURES WITH MODILE TEST FACILITY,
Burns and Roe Construction Corp., Paramus, N.J.
E. I. Ewoldsen, M. H. Jhawar, and P. Mothes.
Available from the National Technical Information Service as PB-223 352 $18.00 in paper copy, $1.45 in microfiche. Office of Saline Water Research and Development Progress Report No 885, September 1973. 296 p, 103 fig, 88 tab. OSW Contract 14-30-2592.

Descriptors: *Desalination, Desalination Processes, Descaling, *Electrodialysis, *Membrane Processes, Pilot Plants, *Reverse Osmosis, *Brackish water.
Identifiers: Hollow Fine Fiber Modules, Spiral Wound Modules.

A mobile brackish water test facility was established to demonstrate the ability of reverse osmosis and electrodialysis processes to produce potable water from brackish water in the Southwest United States. Commercially available equipment was employed. The reverse osmosis units consisted of tubular, spiral wound, and hollow fine fiber modules with capacities from 300 to 5000 GPD. Tests were made to determine problems of operation at high recovery, or conditions under which scaling might occur. Pretreatment consisted of removing calcium and magnesium, sediment filtration, iron and manganese removal and organic material removal. The flux decreases observed were due largely to fouling and scaling. Flushing the unit restored the flux except where calcium sulfate was encountered. Salt rejection was not seriously affected by fouling except in the case of the hollow fine fiber units, where decreases of 5 to 10% were noted. Tubular units with turbulence promoters were least affected by scaling. Electrodialysis unit was operated successfully on two low salinity wells. Iron and calcium sulfate buildup gave some problems. Operation on high salinity wells was marginal. (OSW)
W74-01934

INVESTIGATION OF THE EFFECT OF COATINGS ON THE FAILURE MECHANISMS OF FIBERGLASS YARN IN TUBULAR REVERSE OSMOSIS SUPPORTS,
Philco-Ford Corp., Newport Beach, Calif.
R. H. Williams, A. O. Brodie, C. H. Lewis, J. S. Field, and J. C. Britt.
Available from National Technical Information Service as PB-223 382 $6.50 in paper copy, $1.45 in microfiche. Office of Saline Water Research and Development Progress Report 884, September 1973. 80 p, 23 fig, 11 tab, 7 ref. OSW Contract 14-30-2844.

Descriptors: *Desalination, Desalination processes, *Membrane processes, *Reverse osmosis.
Identifiers: *Tubular modules, Fiberglass yarns, Yarn coatings, Fluorocarbon coatings, Helical tubular segments.

The objective of this program was to increase the lifetime of braided pressure supports used in reverse osmosis tubular modules by means of selection of the most appropriate fiberglass yarns and yarn coatings. A mathematical model has been developed to allow a more analytical approach to yarn selection and braided pressure support design. An extensive body of yarn test data has been generated in the evaluation of potential yarns and coatings. This includes results of tensile tests of wet and dry specimens, abrasion/flexure tests, microphotographs of yarn cross-sections, and accelerated life cycle tests of braided pressure supports. The most promising yarns appear to be those which are composite strands of polyester and fluorocarbon coated glass. Thermosetting acrylic impregnants coupled with fluorocarbon top coats were found to be the most effective in preserving glass yarnstrength in a wet environment. (OSW)
W74-01935

TUBULAR REVERSE OSMOSIS MEMBRANE DEVELOPMENT USING SULFONATED POLYPHENYLENE OXIDE,
General Electric Co., Lynn, Mass.
P. J. Chludzinski.
Available from National Technical Information Service as PB-223 196 $3.50 in paper copy, $1.45 in microfiche. Office of Saline Water Research and Development Progress Report 881, September 1973. 64 p, 14 fig, 7 tab. OSW Contract 14-30-2824.

Descriptors: *Desalination, Desalination Processes, *Reverse Osmosis, *Membrane Processes, Oxides.
Identifiers: *Tubular membranes, Porous polypropylene substrate, Laboratory study.

Work was conducted to develop reverse osmosis tubular elements composed of PPO-SO3H membranes cast onto porous substrates and held in standard porous fiberglass backing tubes. Results showed the feasibility of using hydrophobic grade of porous polypropylene as substrate. The tubular membrane/substrates demonstrated integral films of polymer on the substrate which were rugged and easily handled. As to performance, flux and rejections (based on feed) were about 40 gfd and 90%. Full sized tubes at 600 psi and 80F (Webster, S.D. water) showed about 7 to 8 gfd at about 85% refection. The performance of full-sized tubes was always lower than flat sheet counterparts cut from the tubes after full-sized tube sheets. Tests with flat sheets of the meniscus-coated membrane on porous polypropylene using secondary sewage showed the ability to regenerate the system after fouling. At 500 psi and 85F, initial flux was 10 fgd with sodium ion rejection about 85%, and chemical oxygen demand rejection about 97%. It was concluded that because of the PPO-SO3Na membraned resistance to high temperature and corrosive chemicals, it would be a good candidate for use on secondary sewage. (OSW)
W74-01936

FURTHER DEVELOPMENTS OF WATER DESALINATION SYSTEMS BASED ON LARGE SPIRAL-WOUND REVERSE OSMOSIS MEMBRANE ELEMENTS,
Gulf Environmental Systems Co., San Diego, Calif.
G. E. Forman, S. S. Kremen, W. W. Wight, and T. D. Wolfe.
Available from the National Technical Information Service as PB-223 420 $5.50 in paper copy, $1.45 in microfiche. Office of Saline Water Research and Development Progress Report 880, April 19[illegible] 120 p, 52 fig, 21 tab, 2 ref. OSW Contract 14-30-2641.

Descriptors: *Desalination, Desalination Processes, *Reverse Osmosis, *Brackish Water, *Membrane Processes, Pilot Plants, Membranes.
Identifiers: *Cellulose Acetate Membranes, Spiral Wound Modules, Membrane Supports.

Work was directed toward attaining the capability to produce on a volume basis large spiral-wound membrane elements with membrane cast directly on the support fabric. A major effort was devoted to casting membranes on woven Dacron sailcloth, with additional effort on lower cost support materials such as nonwoven Dacron fabrics and papers. The main objective of this effort was to develop high-refection, compaction-resistant membrane elements capable of producing a minimum water flux of 16 gal/ft2 of membrane area per day at 600 psi from a natural feedwater after 10,000 hrs of operation. This objective was attained with membrane elements fabricated from a formamide membrane formulation cast on D-601 sailcloth. These membrane elements were tested on pretreated San Diego tap water for more than 2500 hrs. Salt refection capability throughout the test was approximately 96.5%. Using the flux decline slope obtained for these membrane elements during the testing run (2500 hrs), the calculated water flux would be greater than 17 gal/sq ft day after 10,000 hrs. of operation at 600 psi. (OSW)
W74-01937

COMPUTER SYSTEM FOR THE DESCRIPTION AND EVALUATION OF COMMUNITY WATER SYSTEMS BASED ON REVERSE OSMOSIS DESALINATION,
Digital Systems Corp., Hanover, N.H.
S. A. Gembicki, R. L. Brewster, P. W. Weaver, and P. T. Shannon.
Available from the National Technical Information Service as PB-223 184 $7.00 in paper copy, $1.45 in microfiche. Office of Saline Water Research and Development Progress Report 876, September 1973. 311 p, 51 fig, 7 tab, 12 ref. OSW Contract 14-30-2783.

Descriptors: *Desalination, Desalination Processes, *Reverse Osmosis, Economic Impact, *Cost Analysis, *Brackish Water, Systems Analysis, *Computer Programs, *Water supply, Community development.

A modular digital computer system has been developed for the analysis of specific community brackish water needs. The system provides an analytical tool to facilitate individual communities to determine the cost effective total water system best suited for their specific requirements. The system provides current technology and cost information as well as a highly flexible format which readily facilitates incorporation of new and projected desalting technology. The system is a set of unit programs which perform all engineering and financial calculations for the individual basic components of a water supply system: well, pretreat, pump, reverse osmosis plant, pipe, pond, etc. Other unit programs perform cost summaries and community financial analysis which compute bond repayment schedules and their relation to projected per capita income, population, and real estate values. (OSW)
W74-01938

3B. Water Yield Improvement

LIDAR EVALUATION OF FOG DISSIPATION TECHNIQUES,
Stanford Research Inst., Menlo Park, Calif.
For primary bibliographic entry see Field 02B.
W74-01888

WEATHER MODIFICATION OPERATIONS IN CALIFORNIA, OCTOBER 1, 1969--SEPTEMBER 30, 1970,
California State Dept. of Water Resources, Sacramento. Div. of Resources Development.
M. M. Schwartz, and J. B. Powers.
Available from State of Calif, Documents Section, P.O. Box 20191, Sacramento, Calif 95820 Price $1.00. Bulletin No 16-70, July 1971. 20 p, 3 plate, 5 tab.

Descriptors: *Weather modification, *Artificial precipitation, *Cloud seeding, *California, Projects, Data Collections, Silver iodide, Polyelectrolytes, Surfactants, Fog.
Identifiers: Fog dispersion, Airport.

Weather modification operations were conducted in 10 areas in California during the 1969-70 water year by 9 licensed operators. A project undertaken to suppress fog at the Los Angeles International Airport made use of polyelectrolytes and surfactants. The rest of the projects used silver iodide in various forms to induce precipitation and otherwise modify atmospheric conditions. Four of the licensees acted on their own behalf; the remainder were employed by governmental agencies and public utilities. A long-term program conducted by the Santa Clara County Flood Control and Water District was suspended during the 1969-70 water year because the water supply carried over from the previous year was considered ample. (Woodard-USGS)
W74-01947

SEASONAL CHANGES IN SODIUM AND CHLORIDE CONCENTRATION OF SALTBUSH (ATRIPLEX SPP.) LEAVES AS RELATED TO SOIL AND PLANT WATER POTENTIAL,
Commonwelath Scientific and Industrial Research Organization, Deniliquin (Australia). Riverina Lab.
For primary bibliographic entry see Field 02I.
W74-02105

3C. Use of Water of Impaired Quality

WATER-SALT BALANCE OF SALINE SOILS UNDER IRRIGATION AT THE FOOTHILL PLAINS OF GOLODNAYA STEPPE, (IN RUSSIAN).
Moscow State Univ. (USSR). Dept. of Pedology.
For primary bibliographic entry see Field 02G.
W74-01753

UPTAKE OF SODIUM, CALCIUM, AND CHLORINE BY COTTON PLANTS DURING IRRIGATION WITH A SOLUTION SIMILAR TO SEA WATER, (IN RUSSIAN),
Agrofizicheskii Nauchno-Issledovatelskii Institut, Leningrad (USSR).
M. K. Mel'nikova, S. R. Tagaev, and I. F. Zubareva.
Fiziol Rast. Vol 19, No 2, p 396-401, 1972. Illus. (English summary).
Identifiers: *Calcium, *Chlorine, *Cotton plants, Irrigation, *Sodium, Soils, Toxicity, Turgor, Cations.

Cotton plants were grown under vegetative conditions and irrigated with solutions similar to sea water and with monocationic solutions of different concentration, in order to establish limiting concentrations of the balanced and monocationic solutions killing the cotton plants. The toxic effect of the monocationic solutions was manifested at lower concentrations (10 g/1) than that of the balanced solutions. In soil experiments the irreversible loss of turgor in the plants was found at the concentration of irrigating solutions of 30 g/1. Such elevated resistance of the plants is due to the protecting effect of cations contained in the soil solution.--Copyright 1973, Biological Abstracts, Inc.
W74-01766

WATER RESOURCE PRESERVATION BY PLANNED RECYCLING OF TREATED WASTEWATER,
Culp, Wesner, Culp-Clean Water Consultants, Corona Del Mar, Calif.
For primary bibliographic entry see Field 05D.
W74-01866

3D. Conservation in Domestic and Municipal Use

METHODOLOGIES FOR FLOW PREDICTION IN URBAN STORM DRAINAGE SYSTEMS,
Illinois Univ., Urbana. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05D.
W74-01656

ARID URBAN WATER MANAGEMENT: SOME ECONOMIC, INSTITUTIONAL AND PHYSICAL ASPECTS,
Nevada Univ., Reno. Desert Research Inst.; and Nevada Univ., Reno. Center for Water Resources Research.
For primary bibliographic entry see Field 06B.
W74-01662

STUDIES IN THE ANALYSIS OF METROPOLITAN WATER RESOURCE SYSTEMS-VOLUME VII: CONFLICT AND

CHOICE: MULTIOBJECTIVE WATER--RESOURCES PLANNING,
Cornell Univ., Ithaca, N.Y.
For primary bibliographic entry see Field 06A.
W74-01784

URBAN GROWTH AND THE WATER REGIMEN. HYDROLOGIC EFFECTS OF URBAN GROWTH,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 04C.
W74-01847

WATER MANAGEMENT.
Orange-Seminole-Osceola Planning Commission, Orlando, Fla.
For primary bibliographic entry see Field 06F.
W74-01850

WATER POLLUTION, ENVIRONMENTAL ENHANCEMENT STUDY, (4).
Lehigh-Northampton Counties Joint Planning Commission, Lehigh Valley, Pa.
For primary bibliographic entry see Field 05G.
W74-01852

BOISE METROPOLITAN AREA SANITARY SEWAGE COLLECTION AND TREATMENT FACILITIES: PHASE II REPORT.
J-U-B Engineers, Inc., Boise, Idaho; and Barton, Stoddard, Milhollin and Higgins, Boise, Idaho.
For primary bibliographic entry see Field 05D.
W74-01854

MISSISSIPPI/MINNEAPOLIS-A PLAN AND PROGRAM FOR RIVERFRONT DEVELOPMENT.
Riverfront Planning Team of Minneapolis Planning and Development, Minn.

1972. 130 P, 80 FIG, PHOTOS, 5 TAB, 53 REF, APPEND.

Descriptors: *Comprehensive planning, Water resources development, Rivers, *Land use, Multipurpose projects, Recreation facilities, *Minnesota, *Mississippi River.
Identifiers: *Riverfront development, Open space, Water/land interface, *Minneapolis (Minn).

This comprehensive plan for Riverfront rejuvenation utilizes the functional and visual frameworks of leisure activity, housing, industry and commerce, movement, environmental quality and environmental design in coordinating the development of the total Riverfront and each of its subareas. Key to creating a new river image, for providing a development framework and inducing further improvement efforts are Nicollet Island, Main Street, and East Bank Residential Development. Nicollet Island will be a primary public open space, with green spaces interwoven with manmade canals, pedestrian and cycling paths, and an historic village, a learning center, and an amphitheater. Main Street will be a mixed residential/commercial district, where the historic character of the area will be strongly perserved. Further residential development on the East Bank between Main Street and University Avenue will provide necessary support for the commercial and recreational foci, while in turn complimented by them. The upper Riverfront will be reserved for river oriented industrial usage. Along with new land use arrangement, a comprehensive movement system for vehicular, pedestrian, and cycling access will be developed. Vehicular access is essential for attracting people from the larger geographical areas while pedestrian and cycling paths will link the various nodes of land use along the river itself. Riverfront redevelopment will be a 20-25 year effort involving both public and private investment programs. Details of the development in terms of both subareas and functional and visual frameworks are discussed with the aid of numerous explicit graphics. (Hoffman-North Carolina)
W74-01855

THE ADAPTED PUBLIC INVESTMENT MODEL WITH PARTICULAR REFERENCE TO THE WATER RESOURCE SECTOR IN METROPOLITAN DEVELOPMENT,
North Carolina Univ., Chapel Hill. Dept. of City and Regional Planning.
For primary bibliographic entry see Field 06C.
W74-01862

A CONSERVATION ELEMENT FOR THE SACRAMENTO GENERAL PLAN.
Sacramento City Planning Commission, Calif.
For primary bibliographic entry see Field 06G.
W74-01864

WATER RESOURCE PRESERVATION BY PLANNED RECYCLING OF TREATED WASTEWATER,
Culp, Wesner, Culp-Clean Water Consultants, Corona Del Mar, Calif.
For primary bibliographic entry see Field 05D.
W74-01866

SOUTHERN TIER EAST REGIONAL PLAN, BROOME-TIOGA COUNTIES, PRIORITIES FOR THE RIVERBANKS PLAN.
Egner and Niederkorn Associates, Inc., Ithaca, N.Y.
For primary bibliographic entry see Field 06B.
W74-01871

SOUTHERN TIER EAST REGIONAL PLAN, BROOME-TIOGA COUNTIES, RECREATION, OPEN SPACES, RIVERBANKS.
Egner and Niederkorn Associates, Inc., Ithaca, N.Y.
For primary bibliographic entry see Field 06B.
W74-01872

WATER DEMAND OF SINGLE DWELLING RESIDENCES (DEMANDE EN EAU DE RESIDENCES UNIFAMILIALES),
For primary bibliographic entry see Field 06D.
W74-02045

ECONOMIC GUIDELINES FOR PUBLIC UTILITIES PLANNING,
Duke Univ., Durham, N.C. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05D.
W74-02114

VACATION HOME LOCATION: A MODEL FOR SIMULATING THE RESIDENTIAL DEVELOPMENT OF RURAL RECREATION AREAS,
North Carolina Univ., Chapel Hill. Center for Urban and Regional Studies.
For primary bibliographic entry see Field 06B.
W74-02115

COMPREHENSIVE SEWERAGE PLAN FOR GRAND ISLAND, NEBRASKA.
Black and Veatch, Kansas City, Mo.
For primary bibliographic entry see Field 05D.
W74-02123

TECHNICAL AND ECONOMIC EVALUATION OF EXISTING WASTEWATER TREATMENT FACILITIES AND ALTERNATIVE METHODS OF DISPOSAL OF TREATED EFFLUENT, HOUSTON, MISSOURI.
Bartholomew (Harland) and Associates, St. Louis, Mo.
For primary bibliographic entry see Field 05D.
W74-02125

WATER AND THE LAND: OPPORTUNITIES AND PROBLEMS IN FORSYTH, NORTH CAROLINA.
City-County Planning Board, Winston-Salem, N.C.
For primary bibliographic entry see Field 04A.
W74-02129

WATER SUPPLY AND SEWERAGE SERVICES: TOOLS FOR AFFECTING THE QUALITY OF LIFE IN FORSYTH COUNTY, N.C., VOLUME D IN THE LAND POTENTIALS SERIES.
City-County Planning Board, Winston-Salem, N.C.
For primary bibliographic entry see Field 05D.
W74-02130

UNITARY WATER SUPPLY AND SEWERAGE SERVICES.
City-County Planning Board, Winston-Salem, N.C.
For primary bibliographic entry see Field 05D.
W74-02131

MUNCIE INDIANA'S 'TOTAL' LOCAL WATER QUALITY PROGRAM,
Muncie Sanitary District, Ind. Water Quality Div.
For primary bibliographic entry see Field 05B.
W74-02132

MUNCIE SANITARY DISTRICT, 1972, 8TH ANNUAL REPORT.
Muncie Sanitary District, Ind.
For primary bibliographic entry see Field 05D.
W74-02133

AN OLD PIPE LINE BROUGHT BACK TO LIFE,
Westchester County Water Agency, White Plains, N.Y.
For primary bibliographic entry see Field 08F.
W74-02134

COMPARISON OF SEWER DISCHARGE HYDROGRAPHS COMPUTED FROM IN--SEWER MEASUREMENTS AND FROM SYNTHESIZED HYDROGRAPH PROCEDURES, CITY OF ST. PAUL, MINNESOTA.
Horner and Shifrin, Inc., St. Louis, Mo.
For primary bibliographic entry see Field 05D.
W74-02135

3E. Conservation in Industry

RELATION OF ERTS-1 DETECTED GEOLOGIC STUCTURE TO KNOWN ECONOMIC ORE DEPOSITS,
Stanford Univ., Calif. Dept. of Geology.
For primary bibliographic entry see Field 07C.
W74-01707

STRUCTURAL GEOLOGICAL ANALYSIS OF NEVADA USING ERTS-1 IMAGES: A PRELIMINARY REPORT,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W74-01709

REGIONAL TECTONIC CONTROL OF TERTIARY MINERALIZATION AND RECENT FAULTING IN THE SOUTHERN BASIN RANGE PROVINCE, AN APPLICATION OF ERTS-1 DATA,
Argus Exploration Co., Newport Beach, Calif.
For primary bibliographic entry see Field 07C.
W74-01710

THE STEEL INDUSTRY AND ENVIRONMENTAL QUALITY.
National Industrial Pollution Control Council, Washington, D.C. Steel Sub-Council.
For primary bibliographic entry see Field 05G.
W74-01841

A STUDY OF THE ECONOMIC IMPACT ON THE STEEL INDUSTRY OF THE COSTS OF MEETING FEDERAL AIR AND WATER POLLUTION ABATEMENT REQUIREMENTS. PART III.
Booz-Allen Public Administration Services, Inc., Washington, D.C.
For primary bibliographic entry see Field 05G.
W74-01844

EXPERIMENTAL RESULTS FROM PROCESSING GASBUGGY GAS IN A NATURAL GAS PROCESSING PLANT,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 05B.
W74-02021

FLOOD PROTECTION FOR MISSOURI BOTTOMS.
Horner and Shifrin, Inc., St. Louis, Mo.
For primary bibliographic entry see Field 04A.
W74-02128

3F. Conservation in Agriculture

BIBLIOGRAPHY ON OPTIMIZATION OF IRRIGATION SYSTEMS,
Illinois Univ., Urbana. Dept. of Civil Engineering.
D. D. Meredith.
Available from the National Technical Information Service as PB-225 478/7, $in paper copy; $1.45 in microfiche. Illinois Water Resources Center, Urbana, Research Report No. 71, September 1973, 123 p, 1,918 ref. OWRR B-084-ILL (1), 14-31-0001-4080.

Descriptors: *Irrigation systems, *Bibliographies, *Optimization, Alphalfa, Beans, Corn, Cotton, Grasses, Potatoes, Rice, Soybeans, Tobacco, Tomatoes, Wheat.
Identifiers: Fruit crops, *Crop response, *Plant physiology.

This bibliography contains 1,918 literature references pertaining to optimization of irrigation systems. The references are listed alphabetically by author for the following topics: plant response to physical environment; and methodologies for optimization.
W74-01657

IDENTIFICATION OF WINTER WHEAT FROM ERTS-1 IMAGERY,
Kansas Univ./Center for Research, Inc., Lawrence.
D. L. Williams, S. A. Morain, B. Barker, and J. C. Coiner.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Report NASA SP-327, p 11-18, 1973. 4 fig, 1 tab.

Descriptors: *Remote sensing, *Satellites (Artificial), *Wheat, *Kansas, Land use, Crops, Surveys, Mapping, Data collections.
Identifiers: ERTS.

By interpretation of ERTS-1 data in Finney County, Kansas, winter wheat can be successfully identified. This successful identification is based on recognition of tonal signatures on MSS images. Several different but highly successful interpretation strategies involve the use of both spectral and temporal inputs. Good results were obtained from a single MSS-5 image acquired at a critical time in the crop cycle (planting). On a test sample of 54,612 acres, 89% of the acreage was correctly classified as wheat or nonwheat, and the estimated wheat acreage (19,516 acres) was 99% of the actual acreage of wheat in the sample area. (See also W74-01663) (Knapp-USGS)
W74-01665

SEMI-AUTOMATIC CROP INVENTORY FROM SEQUENTIAL ERTS-1 IMAGERY,
California Univ., Riverside. Dept. of Geography.
C. W. Johnson, and V. B. Coleman.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 19-25, 1973. 1 fig, 2 tab.

Descriptors: *Remote sensing, *Satellites (Artificial), *Crops, *California, Land use, Surveys, Mapping, Data processing, Data collections.
Identifiers: ERTS, *Crop identification.

A newly introduced crop in the Imperial (California) Valley can be detected by sequential ERTS-1 imagery. Individual crop types can be identified by remote sensing techniques. A system for the identification of field conditions enables the production of a statistical summary within two to three days of receipt of the ERTS-1 imagery. The summary indicates the total acreage of producing crops and irrigated planted crops currently demanding water and further indicates freshly plowed fields that will be demanding water in the near future. Relating the field conditions to the crop calendar of the region by means of computer techniques provides specific crop identification for the 8,000 plus fields. (See also W74-01663) (Knapp-USGS)
W74-01666

CROP IDENTIFICATION USING ERTS IMAGERY,
South Dakota State Univ., Brookings. Remote Sensing Inst.
M. L. Horton, and J. L. Heilman.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 27-33, 1973. 4 fig, 1 tab, 5 ref.

Descriptors: *Remote sensing, *Satellites (Artificial), *Crops, *South Dakota, Land use, Surveys, Mapping, Data processing, Data collections.
Identifiers: ERTS, Crop identification.

Digital analysis of August 15 ERTS-1 imagery for southeastern South Dakota was tested to determine the feasibility of conducting crop surveys from satellites. Selected areas of bands 4,5,6, and 7 positive transparencies were converted to digital form utilizing signal analysis and dissemination equipment. The optical transmission values were printed out in a spatial format. Visual analysis of the printouts indicated that cultivated areas were readily distinguished from non-cultivated areas in all four bands. Bare soil was easily recognized in all four bands. Corn and soybeans, the two major crops in the area, were treated as separate classes rather than as a single calss called row crops. Bands 6 and 7 provided good results in distinguishing between corn and soybeans. (See also W74-01663) (Knapp-USGS)
W74-01667

IDENTIFICATION OF LARGE MASSES OF CITRUS FRUIT AND RICE FIELDS IN EASTERN SPAIN,
F. Lopez de Sagredo, and F. G. Salinas.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 35-36, 1973.

Descriptors: *Remote sensing, *Satellites (Artificial), *Crops, *Citrus fruits, *Rice, Land use, Surveys, Mapping, Data collections.
Identifiers: ERTS, *Crop identification, *Spain.

ERTS-1 imagery has been successfully used for the identification of large areas of citrus groves and rice fields in the Valencia region of eastern Spain. Results are encouraging and will facilitate the elaboration of a land use map with a fair degree of definition once methods prove to be fully operational. (See also W74-01663) (Knapp-USGS)
W74-01668

ENGINEERING ANALYSIS OF ERTS DATA FOR SOUTHEAST ASIAN AGRICULTURE,
General Electric Co., Philadelphia, Pa. Re-entry and Environmental Systems Div.
H. L. Heydt, and A. J. McNair.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 37-52, 1973. 12 fig.

Descriptors: *Remote sensing, *Satellites (Artificial), *Crops, *Rice, Asia, Land use, Surveys, Mapping, Data collections.
Identifiers: *Philippines, *Crop identification, ERTS.

To apply ERTS data to rice fields in the Philippines, two primary study objectives are to establish the feasibility of extracting from ERTS imagery the areas where rice is grown, and to determine those measurements on the imagery which enable the assessment of crop condition. Achieving these objectives with procedures which can be cost-effective can lead the way toward yield prediction, irrigation system management, and similar functions which are known to be important needs in Southeast Asia. (See also W74-01663) (Knapp-USGS)
W74-01669

AN INTERREGIONAL ANALYSIS OF NATURAL VEGETATION ANALOGUES USING ERTS-1 IMAGERY,
Earth Satellite Corp., Berkeley, Calif.
C. E. Poulton, and R. I. Welch.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol 1--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept SP-327, p 53-57, 1973. 1 ref.

Descriptors: *Remote sensing, *Satellites (Artificial), *Crops, *Rice, Louisiana, California, Land use, Surveys, Mapping, Data collections.
Identifiers: *Crop identification, ERTS.

In ERTS-1 imagery, in the proper seasons, rice has a unique signature and within-field variation that is related to cultivation. Unique signatures were also found for four natural vegetation types from color prints, and some promising color additive analytical techniques are being developed. (See also W74-01663) (Knapp-USGS)
W74-01670

EVALUATION OF REMOTE SENSING IN CONTROL OF PINK BOLLWORM IN COTTON,
California Univ., Riverside. Citrus Research Center and Agricultural Experiment Station.
V. B. Coleman, C. W. Johnson, and L. N. Lewis.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 127-133, 1973. 3 fig. NASA Contract NAS 5-21771.

Descriptors: *Remote sensing, *Satellites (Artificial), *Cotton, *Pest control, *California, Insect control, Data collections, Surveys.
Identifiers: ERTS, *Pink bollworm.

There are approximately 800,000 acres of cotton in California, and they are mapped yearly by ground survey teams. A more practical means of accomplishing that objective seemed necessary, and satellite data form ERTS-1 was considered a viable alternative. Cotton in the Imperial, Coachella, and Palo Verde Valleys is heavily infested by the pink bollworm which affects both the quantity and quality of cotton produced. The California State Department of Agriculture, therefore, has regulated the growing season of cotton by establishing planting and plowdown dates. These procedures ensure that the larvae, whose diapause or resting period occurs during the winter months, will have no plant material on which to feed, thus inhibiting spring moth emergence. The ERTS-1 multispectral scanner (MSS) data are being analyzed to determine which combinations of dates and colors will identify cotton fields and thus provide the data needed to produce maps of the fields for the forthcoming cotton season. (See also W74-01663) (Knapp-USGS)
W74-01679

APPLICATION OF ERTS-1 IMAGERY AND UNDERFLIGHT PHOTOGRAPHY IN THE DETECTION AND MONITORING OF FOREST INSECT INFESTATIONS IN THE SIERRA NEVADA MOUNTAINS OF CALIFORNIA,
Natural Resources Management Corp., Berkeley, Calif.
R. C. Hall.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 135-142, 1973. 3 fig.

Descriptors: *Remote sensing, *Satellites (Artificial), *Cotton, *Pest control, *California, Insect control, Data collections, Surveys.
Identifiers: ERTS, *Pink bollworm.

Preliminary analysis of ERTS-1 imagery in a rugged mountain area in the Sierra Nevada Mountains of California indicates some promising possibilities of detecting two types of insect infestations. Detecting and mapping other features such as timber or untimbered areas, timber stand density, principal stream courses, mountain meadows, lakes, massive rock outcrop, rock domes, riparian vegetation, grazing land, and glaciers is also feasible. (See also W74-01663) (Knapp-USGS)
W74-01680

APPLICATION OF ERTS-1 DATA TO ANALYSIS OF AGRICULTURAL CROPS AND FORESTS IN MICHIGAN,
Michigan Agricultural Experiment Station, East Lansing.
G. R. Safir, W. L. Myers, W. A. Malila, and J. P. Morgenstern.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 173-180, 1973. 2 fig, 2 tab.

Descriptors: *Remote sensing, *Satellites (Artificial), *Surveys, *Crops, *Forests, Land use, Mapping, Data collections, Data processing, *Michigan.
Identifiers: *Crop identification, ERTS.

ERTS data were collected over southwestern Lower Michigan on August 25, 1972. Major agricultural crops such as corn and soybeans were approaching maturity at this date and forest canopies were dense. Extensive ground truth information was gathered by detailed field study of test strips. This detailed information was supplemented over larger areas by interpretation of photography and MSS imagery. The U.S.D.A.-A. S. C. S. also cooperated by providing information on crops from their records. The recognition process was successful for each type of vegetation which had a dense green canopy such as forests, corn, and soybeans. Bare soil was also recognizable as a category. However, recognition of species was difficult in senescing or senescent vegetation. Since the accuracy of recognition depends on stage of growth, optimum times for collecting data will vary from one crop to the next. (See also W74-01663) (Knapp-USGS)
W74-01684

CROP SPECIES RECOGNITION AND MENSURATION IN THE SACRAMENTO VALLEY,
Environmental Research Inst. of Michigan, Ann Arbor.
F. J. Thomson.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 181-188, 1973. 2 fig, 2 tab, 3 ref.

Descriptors: *Remote sensing, *Satellites (Artificial), *Crops, *California, Land use, Surveys, Mapping, Data processing, Data collections.
Identifiers: ERTS, *Crop identification, *Sacramento Valley.

Crop recognition maps were generated by applying multispectral pattern recognition technique to ERTS-MSS digital taped data. The results were improved and extended by field studies. The mensuration accuracy is affected by the presence of an edge effect surrounding nearly all fields. Using a processing technique to estimate the proportions of unresolved objects in this edge region improves mensuration capability. (See also W74-01663) (Knapp-USGS)
W74-01685

THE RESULTS OF AN AGRICULTURAL ANALYSIS OF THE ERTS-1 MSS DATA AT THE JOHNSON SPACE CENTER,
National Aeronautics and Space Administration, Houston, Tex. Lyndon B. Johnson Space Center.
R. M. Bizzell, L. C. Wade, H. L. Prior, and B. Spiers.
In: Symposium on Significant Results Obtained from the Earth Resources TechnologySatellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 189-196, 1973.

Descriptors: *Remote sensing, *Satellites (Artificial), *California, Land use, Surveys, Mapping, Data processing, Data collections.
Identifiers: ERTS, *Crop identification, *San Joaquin Valley (Calif).

An area in the San Joaquin Valley was submitted to an intensive evaluation of ERTS data to discriminate between crop types and to provide a reasonably accurate area measurement of agricultural features of interest. ERTS-1 MSS data can provide identifications and extent of agricultural lands and field crop types. Later data sets of Hardin Co., Iowa, and Holt Co., Nebraska, have undergone preliminary analyses as a portion of a joint USDA/ASCS-NASA/JSC ERTS-1 data evaluation project. These preliminary results using the same techniques as those carried out on the Monterey data show an ability to descriminate major crops which are representative of different agricultural practices. (See also W74-01663) (Knapp-USGS)
W74-01686

AGRICULTURAL APPLICATIONS OF ERTS-1 DATA,
California Univ., Berkeley. Forestry Remote Sensing Lab.
W. C. Draeger.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 197-204, 1973. 1 tab.

Descriptors: *Remote sensing, *Satellites (Artificial), *California, *Urbanization, Land use, Surveys, Mapping, Data processing, Data collections.
Identifiers: ERTS, *Crop identification.

A satellite sensing system, with which large areas of land can be surveyed in their entirety on one image and which can provide uniform worldwide coverage with a relatively small number of images, offers great promise as a data collection tool. ERTS makes possible regular, frequent observations of each spot on the earth's surface, and provides a service which would be totally infeasible using conventional techniques. An experiment is being performed in Maricopa County, Arizona, and San Joaquin County, California, in cooperation with State and federal agencies. Delineations of land use were meaningful on a quantitative basis. Furthermore, the method of data collection proved to be quite efficient. The use of satellite imagery in monitoring the shift of land use in agricultural areas has been investigated using coverage of the Maricopa County test site acquired both from Apollo 9 and from ERTS-1. All of the agricultural land shifts were to urban uses of various kinds, mostly urban residential usage. The total agricultural acreage shift into urban usage was computed to be approximately 28,160 acres, indicating an average annual shift of approximately 9,400 acres of agricultural land coverted to urban use each year. A survey of safflower fields in a portion of the San Joaquin County, California, test site was carried out using human photo interpreters. The identification test produced an 83% correct identification. An interpreter can detect and delineate individual fields on the imagery. Computerized systems can produce fast and accurate crop classifications, a potentially powerful tool for the collection of agricultural information on a regional basis. (See also W74-01663) (Knapp-USGS)
W74-01687

IDENTIFICATION OF AGRICULTURAL CROPS BY COMPUTER PROCESSING OF ERTS MSS DATA,
Purdue Univ., Lafayette, Ind. Lab. for Applications of Remote Sensing.
M. E. Bauer, and J. E. Cipra.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 205-212, 1973. 3 fig, 5 tab.

Descriptors: *Remote sensing, *Satellites (Artificial), *Crops, *Illinois, Land use, Surveys, Mapping, Data processing, Data collections.
Identifiers: ERTS, *Crop identification.

Computer-processed ERTS MSS data classifications accurately identify crop species (corn and soybeans). The classifications of satellite data over a 2,000 square-mile area in northern Illinois not only covered more than 100 times the area

previously covered using aircraft but also yielded improved results through the use of temporal and spatial data in addition to the spectral information. Comparisons of acreage estimates from ERTS data and ground-based systems agreed well. The results demonstrate the potential utility of this technology for obtaining crop production information. (See also W74-01663) (Knapp-USGS)
W74-01688

IDENTIFICATION AND MAPPING OF SOILS, VEGETATION, AND WATER RESOURCES OF LYNN COUNTY, TEXAS BY COMPUTER ANALYSIS OF ERTS MSS DATA,
Purdue Univ., Lafayette, Ind. Lab. for Applications of Remote Sensing.
M. F. Baumgardner, S. J. Kristof, and J. A. Henderson.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 213-221, 1973. 7 fig, 1 tab.

Descriptors: *Remote sensing, *Satellite (Artificial), *Crops, *Texas, Land use, Surveys, Mapping, Data processing, Data collections.
Identifiers: ERTS, *Crop identification, *Lynn County (Tex).

ERTS MSS data were tested for mapping and monitoring soil, vegetation, and water resources in Lynn County, Texas. Using computer-implemented overlay techniques, ERTS MSS data obtained on three different dates were analyzed. Temporal changes in vegetation and water supply in Lynn County were identified and mapped. Features which were identified include row crops, unimproved and improved rangelands, bare soils, hydrologic features, and gross geologic and soils features. These techniques may be used to identify drought and other crop stress conditions, crops damaged by hailstorms, areas of active wind erosion, crop species, and soil patterns. (See also W74-01663) (Knapp-USGS)
W74-01689

CAPABILITY OF ERTS-1 IMERGY TO INVESTIGATE GEOLOGICAL AND STRUCTURAL FEATURES IN A SEDIMENTARY BASIN (BASSIN PARISIEN, FRANCE),
Bureau de Recherches Geologiques et Minieres, Orleans (France). Departement Carte Geologique et Geologie Generale.
C. Cavelier, J-Y. Scanvic, G. Weecksteen, and A. Ziserman.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 273-282, 1973. 3 fig, 6 ref.

Descriptors: *Remote sensing, *Satellites (Artificial), *Geologic mapping, Structural geology, Exploration, Geology, Data collections, Aerial photography, Surveys.
Identifiers: ERTS, *France (Paris basin).

A preliminary study of ERTS MSS imagery is in progress on the Paris sedimentary basin. Crops and natural vegetation are well distributed over the site. The main geological units and detected or enhanced by agricultural land use and natural vegetation. Alluvial deposits are outlined by grass and poplar trees. Some spatial relationship of geological stuctures may be identified or extended by using results from different spectral bands. (See also W74-01663) (Knapp-USGS)
W74-01695

WATER MANAGEMENT USING SUBSURFACE DRAINS,
North Carolina State Univ., Raleigh. Dept. of Biological and Agricultural Engineering.
J. Kriz, and R. Skaggs.
Journal of Soil and Water Conservation, Vol 28, No 5, p 216-218, September-October 1973 4 fig, 3 ref .

Descriptors: *Irrigation, *Tile drainage, Land management, Water control, Drainage systems, Irrigation systems, Infiltration, Soil water movement, *Water table, *Southern U.S., *Subsurface drains.

Because natural conditions along the southeastern coast of the U.S. allow manipulation of the water table, a combination of irrigation and drainage is feasible for increasing crop and forest yields. The associated costs of installing the system can be divided between the two practices. The natural conditions that must exist for this type of water management include the following: an impermeable layer or a permanent water table at a rather shallow depth to prevent excessive seepage losses; nearly flat land, otherwise the water table might be at an optimum depth on one side of a field while plants suffer from too much or too little water on the other side; a high soil hydraulic conductivity; and a readily available source of water. Field experiments on a Lumbee sandy loan with a 50-foot drain spacing showed that water can be supplied to the root zone of a crop at a more than sufficient rate. Optimal drain spacing was 63 feet for crops requiring a water table depth of 24 to 63 inches. (Knapp-USGS)
W74-01717

THE DIFFUSION RESISTANCE AND WATER STATUS OF LEAVES OF BETA VULGARIS,
Nottingham Univ. (England). Dept. of Physiology and Environmental Studies.
P. V. Biscoe.
J Exp Bot, Vol 23, No 77, p 930-940, 1972, Illus.
Identifiers: Beta-vulgaris, *Diffusion porometer, *Leaves, Soils, *Sugar beet leaves, Water status, Water potential.

Pot-grown sugar-beet plants were deprived of water in 2 experiments until they wilted completely. Leaf resistance to water-vapor transfer was measured directly with a diffusion porometer and compared with values calculated from measurements of transpiration. There was good agreement between the 2 estimates. Leaf turgor-pressure decreased only gradually due, apparently, to an increase in tissue-solute concentration with increasing water deficit. Relationships between leaf water potential, soil water potential, and leaf resistance were established and the effective control of transpiration by small changes in leaf resistance was clearly demonstrated.--Copyright 1973, Biological Abstracts, Inc.
W74-01734

NOTE ON THE BIOLOGY OF RICE WATER WEEVIL, LISSORHOPTRUS ORYZOPHILUS,
Texas A and M Univ., Beaumont. Agricultural Research and Extension Center.
C. C. Bowling.
Ann Entomol Soc Am, Vol 65, No 4, p 990-991, 1972, Illus.
Identifiers: Biology, Light trap, Lissorhoptrus-oryzophilus, *Reproduction, *Rice water weevil, *Weeviis.

The first-stage larvae are easily intercepted after they emerge from the leaf sheath and before they enter the soil. Interception is accomplished by exposing rice plants to ovipositing adults and subsequently suspending plants containing eggs in water. The larvae emerge from the leaf sheath and drift downward through the water to the bottom of the container. Studies on the reproductive capacity of rice water weevil were conducted by intercepting first-stage larvae in 1970 and 1971. A total of 1422 larvae was recovered from the test conducted in 1970. The average larvae per female per day of exposure to the plants was 1.7. In the test conducted in 1971, a total of 784 larvae was recovered, with an average of 2.2 larvae per female per day of exposure. These data are indicative of the reproductive capacity of the rice water weevil at these particular dates only. Similar tests at later dates in 1971 with weevils collected with a light trap indicated that only a few females were reproducing.--Copyright 1973, Biological Abstracts, Inc.
W74-01744

A COMPARATIVE SAMPLE STUDY OF THE CHANGING LAND USE PATTERN ON EITHER SIDE OF SAHYADRI,
Shivaji Univ., Kolhapur (India). Dept. of Geography.
M. D. Tawade.
J Shivaji Univ, Vol 4, No 7/8, p 59-68, 1971, Illus.
Identifiers: *Agriculture planning, Climate, Fertility, *India (Sahyadri), *Land use, Leaching, Migration, Population, Rainfall, Sample, Soil.

The implications of the land use theory are evidently basic to both physical and economic planning especially in the country with development problems concerning the intensification of agricultural production. The agricultural land use of a region is directly related to the fertility of soil, geographical location, prevailing climate and relative mutual distance of fields from the core region. Sahyadri acts as a significant barrier, on either side of which the aforesaid factors vary. The leaching due to heavy rainfall and rugged topography is responsible for low fertility in Konkan, India, whereas the problem is not severe in Kolhapur region. Accordingly the human response is different. Seasonal unemployment and resultant migratory trend exists in Konkan. The higher potentiality of Kolhapur central zone absorbs the population pressure.--Copyright 1973, Biological Abstracts, Inc.
W74-01748

EFFECT OF IRRIGATION AND ALKALI TREATMENT ON THE MICROBIOLOGICAL PROCESSES IN SOIL, (IN UKRAINIAN),
Khersonskii Selskokhozyaistvennyi Institut (USSR).
K. F. Kiver.
Mikrobiol Zh (Kyyiv). Vol 34, No 4, p 489-494, 1972. (English summary).
Identifiers: *Alkali treatment (Soils), *Cabbage, Irrigation, *Microbiological process, *Soil treatment, Yield, *USSR (Ukraine).

Microbiological and enzymic activity was studied in dark chestnut soils of the southern Ukraine under late cabbage. Moistening during the vegetative irrigations by water spraying and furrow irrigation compacts soil. Deep (30-35 cm) soil loosening of interrows by means of a slot-cutter before irrigation favors a deeper penetration of moisture during irrigations and better soil aeration. Irrigation, deepening of fall plowing from 30 to 40 cm and deep loosening by means of a slot-cutter during vegetation, improving soil biological activity, favor an increase of late cabbage yield.--Copyright 1973, Biological Abstracts, Inc.
W74-01761

GROWTH PRODUCTIVITY AND EVAPOTRANSPIRATION, DEPENDING ON SOIL MOISTURE UPON IRRIGATING A PEPPER (CAPSICUM ANNUUM L.) CULTIVATION, (IN ITALIAN),
Padua Univ. (Italy). Istituto di Agronomia Generale e Coltivazioni Erbacee ed Arboree.
L. Giardini, and F. Pimpini.
Riv Agron. Vol 5, No 2/3, p 99-114, 1971. Illus. (English summary).
Identifiers: Capsicum-Annuum, *Evapotranspiration, Growth, Irrigation, Moisture, *Pepper cultivation, *Soil moisture, Transpiration, Crop production.

An investigation was carried out on 'Yolo Wonder' grown in large lysimetric cases to compare 5 tests where 25 cm of top soil were irrigated up to the following lowest levels of (%) available water: 95-100, 60, 45, 30, 15, corresponding to water tensions of 0.3-0.6-0.9-1.5-3.2 atm, respectively. A water soil surplus was almost always found in the first test. Significant differences among tests were observed as to: plant height, leaf number per plant, leaf area, horizontal plant projection, axillary buds, blossoming, setting, early ripening, average fruit weight, fruit length and width, percent dry matter, refractometric wall degree, specific weight of the wall. With the lowest level of available water at the moment of irrigation, the highest fruit yield was reached at 0.6 atm tension irrigation. Overall production, both in the aerial part and in the root stock, follows the same pattern as the fruit. The retarding effect on the vegetative part due to moisture surplus is more marked. The relation fruit dry matter/total dry matter decreased with lowered moisture availability. Dry matter percentage in the epigeic portion is much higher with greater soil tension. In order to yield 1 kilo green fruit, a minimum of 58.41 to a maximum of 76.91 water was required, and the highest values were reached by the 2 extreme tests. An estimate was also made of the evapotranspiration coefficients with reference to other parameters. Evapotranspiration values were correlated with: daily maximum temperature, daily minimum temperature, daily average temperature, relative air moisture and total radiation.--Copyright 1973, Biological Abstracts, Inc.
W74-01762

AGROCLIMATIC CRITERIA FOR DEVELOPMENT OF WHEAT RUST, (IN RUSSIAN),
L. A. Makarova.
Mikol Fitopatol. Vol 6, No 4, p 334-340, 1972. Illus.
Identifiers: *Argo climatic conditions, Rainfall, Temperature, *Wheat rust.

There were linear relations between deposits, hydrothermal conditions, and amount of rainfall, and the development of wheat rust.--Copyright 1973, Biological Abstracts, Inc.
W74-01765

NITRATE IN UNSATURATED ZONE OF AN ALLUVIAL SOIL IN RELATION TO FERTILIZER NITROGEN RATE AND IRRIGATION LEVEL,
Michigan State Univ., East Lansing. Dept. of Crop and Soil Sciences.
For primary bibliographic entry see Field 02G.
W74-01774

THE RELATIONSHIPS BETWEEN SOIL MOISTURE AND THE DEGREE OF STOMATA OPENING IN THE CORN DOUBLE HYBRID,
Academia R. S. R., Bucharest. Institutul de Biologie.
A. Ionescu.
Rev Biol (Lisb), Vol 7, No 3/4, p 203-213, 1971, Illus.
Identifiers: *Corn (Double hybrid), Indicators, Irrigation, *Stomata opening, *Siol moisture.

The degree of stomata opening in irrigated crops in 2 double hybrids was determined. Correlation was observed between soil moisture and available water for the plants and stomata opening. Stomatal movements may be utilized as irrigation indicators.--Copyright 1973, Biological Abstracts, Inc.
W74-01816

COST BENEFIT STUDIES OF IRRIGATION PROJECTS AND SUGGESTIONS FOR THEIR IMPROVEMENT,
Central Water and Power Commission, New Dehli (India).
K. Narayan, and G. V. Rao.
Irrigation and Power, Vol 29, No 3, p 317-326, 1972. 4 tab.

Descriptors: *Methodology, *Irrigation programs, *Economic feasibility, *Cost-benefit analysis, Economic impact, Social impact, Indirect benefits, Value, Model studies.
Identifiers: *India, Investment criteria.

The evolution of public investment decision criterion from strict economic feasibility tests to the use of benefit-cost analysis is investigated in the context of irrigation projects in India. Change from the strict economic feasibility test began with recognition of such unproductive works as those which would protect against famines. However, the project was considered unproductive if the water rates did not reflect an adequate percentage of the additional yield accruing to the farmer from irrigation. Thus, the greater benefits toward socio-economic change were ignored and the comprehensive impact of the project overlooked. Studies initiated during 1958 to isolate a more comprehensive criterion discovered the extensive direct and indirect benefits associated with five major projects and recommended the future use of benefit-cost analysis with a minimum ratio of 1.5 required to justify investment. Adoption of this new criterion resulted in the sanction of 31 projects which previously had not been found financially feasible. Critical evaluation of application of cost-benefit analysis indicated need for improvements to ensure uniform procedure and compatible results among regions and emphasized that fully qualified personnel execute the analysis. (Weaver-Wisconsin)
W74-01842

SEWAGE FARMING,
Washington Univ., St. Louis, Mo., Center for the Biology of Natural Systems.
For primary bibliographic entry see Field 05D.
W74-01863

INFLUENCE OF OVERHEAD SPRINKLER SYSTEMS ON SPIDER MITE POPULATIONS IN NORTH COAST VINEYARDS OF CALIFORNIA,
California Univ., Albany. Div. of Biological Control.
D. N. Kinn, J. L. Joos, and R. L. Doutt.
Environ Entomol. Vol 1, No 6, p 795-796. 1972. Illus.
Identifiers: *California, Coasts, *Cotton, Populations, *Spider mites, *Sprinkler systems (Overhead), Tetranychus-Pacificus, *Vineyards.

Moisture stress was suggested as a factor predisposing cotton and grape to attack by spider mites, Tetranychus pacificus McGregor. Studies undertaken in North Coast, USA, vineyards indicate that sprinkler irrigation can be utilized in an integrated approach to spider mite control on premium wine varieties.--Copyright 1973, Biological Abstracts, Inc.
W74-01893

PEELED TOMATO YIELD AS AFFECTED BY THE SEASONAL WATER VOLUME IN FUNCTION OF THE WATERING FREQUENCY, (IN ITALIAN),
Bari Univ. (Italy). Instituto di Agronomia.
A. Caliandro.
Riv Agron. Vol 5, No 2/3, p 215-222. 1971. Illus. (English summary).
Identifiers: Seasonal, *Tomato yield, Volume, *Water frequency, Watering, *Crop yield.

Trials were repeated over a 4 yr period on silt-clay soil in southern Italy on 'S. Marzano.' Four different irrigation regimes and an unirrigated control were compared. The irrigation frequencies were determined by potential evapotranspiration (PET) calculated according to the Turc's formula. Water was distributed by furrow when cumulative PET reached values of 18.6, 24.8, 37.2 or 74.5 mm. Commercial yield of peeled tomato increased significantly by increasing irrigation frequency in 3 of the 4 yr. The highest yield, when irrigation was effective, was obtained by the highest frequency of irrigation. Culls decreased as a result of increasing irrigation frequencies. The effect of the irrigation on the yield is given by a higher number of fruits per plant and larger fruits.--Copyright 1973, Biological Abstracts, Inc.
W74-01897

OPTIMUM CONTROL OF IRRIGATION WATER APPLICATION,
Arizona Univ., Tucson. Dept. of Watershed Management.
M. M. Fogel, L. Duckstein, and C. C. Kisiel.
Paper presented at IFAC Symposium on Automatic Control of Water Resource Systems, Haifa, Israel, Sept 16-21, 1973. 16 p, 4 fig, 17 ref. OWRR B-032-ARIZ (3). 14-31-0001-3858.

Descriptors: Watershed management, *Decision making, *Optimization, Mathematical models, Stochastic processes, Simulation analysis, Systems analysis, *Soils, *Irrigation, *Crops.

The problem of controlling soil water within the root zone of irrigated crops to minimize the expected loss is examined. Control is obtained by the amount and timing of irrigations to replenish the soil water reservoir depleted by the crop's water consumption. Actual evapotranspiration rates are a function of the prevailing soil water level and the evaporative demand, which may be considered to be either deterministic or probabilistic. For crops grown on a particular soil, an optimum soil water level is defined as the lowest soil water level above which crops are not stressed. The reduced yield of a crop is related to its growth stage and to the amount and duration that the soil water content is below this optimum value. Existing inventory models are adapted for the purpose of determining the optimal irrigation policy, that is, the timing and amount of water application that result in the maximum return to the irrigation farmer. Solutions to complex decision-making problems are currently available for a variety of irrigation situations. More realistic interpretations of the physical system are the claims made for using this new approach.
W74-01973

THE EFFECTS OF THE WIND SPEED ON THE WATER ABSORPTION OF THE CUCUMBER (IN JAPANESE),
Kagawa Univ., Takamatsu (Japan). Faculty of Agriculture.
H. Miyagawa.
Kagawa Daigaku Nogakubu Gakuzyutu Kokoku. Vol 24, No 1, p 18-24. 1972. Illus. (English summary).
Identifiers: Absorption, *Cucumber, Light, Temperature, *Water absorption, *Wind speed.

The amount of water absorption by the cucumber plants at 115 cm/sec of wind speed was 478 mg/dm2.hr when the cucumber plants were exposed to 0.6 cal/cm2.min light intensity. The absorption was 625 mg/dm2.hr at 0.15 cal/cm2.min light intensity. Water absorption at upward wind speed of 37 cm/sec rapidly decreased at the light intensity of 0.6 cal/cm2.min but gradually diminished at 0.15 cal/cm2.min. The amounts of water absorbed depended not only on the light intensity but also on wind speed. The changes of the stomatal aperture of the cucumber plant leaf were also influenced by wind speed and the light intensity. The temperature of the cucumber leaf was low when large amounts of water were abosrbed. This was caused by latent heat flux from the leaf surface by transpiration.--Copyright 1973, Biological Abstracts, Inc.
W74-01983

THE INFLUENCE OF FERTILIZERS AND IRRIGATION ON GROWTH AND YIELD OF SWEET POTATO,
Punjab Agricultural Univ., Ludhiana (India).
K. S. Nandpuri, R. S. Dhillon, and S. Singh.
Indian J Hortic. Vol 28, No 2, p 139-143. 1971.
Identifiers: *Fertilizers, Growth, *Irrigation, Nitrogen, Potash, *Sweet potato, Yield, Crop yield.

As the N application was increased from 28 kg to 56 kg/ha there was a corresponding increase in the total vine growth, root size and yield. Application of potash and various irrigation intervals (I) did not affect the top growth and root development significantly. Among the various interactions, I X K affected only the root circumference. Combination of potash 34 kg with 7 days and 5 days interval and without potash with 5 days and 3 intervals were equally effective for increasing root thickness. The interaction I X N X K affected number of roots/plant and length and thickness of roots. The best combinations were N 84 kg, potash 34 kg with 3 and 7 days interval and N 84 kg without potash, with 5 days interval.--Copyright 1973, Biological Abstracts, Inc.
W74-01989

THE EFFECT OF NATURAL SHADE AND SPRAYING WITH WATER ON THE PRODUCTIVITY OF DAIRY COWS IN THE TROPICS,
Central Veterinary Lab., Dar es Salaam, (Tanzania).
J. S. MacFarlane, and B. A. Stevens.
Trop Anim Health Prod. Vol 4, No 4, p 249-253. 1972.
Identifiers: Bos-Indicus, Bos-Taurus, *Dairy cows, *Milk productivity, *Shade, *Spraying, Tropics.

The effect of natural shade provided by grazing under coconut palms, and of spraying with water 3 times/day, on the milk yield of Boron (Bos indicus) and Friesian x Boran (50% B. taurus) dairy cattle was examined. The shade treatment was held constant for any 1 cow lactation but the spraying treatment was a single-reversal with an extra period to assess carry-over effects. Shade had a very significant effect on the Friesian crosses increasing the milk yield by 18.4%, but a non-significant depressing effect on the milk yield of the Borans. The effect of spraying was non-significant on both breeds. Seasonal differences were examined and treatment effects on water and salt consumption.--Copyright 1973, Biological Abstracts, Inc.
W74-01994

PLANT-AVAILABLE AND EXTRACTABLE SULFUR IN SOME SOILS OF ENGLAND AND WALES,
Grassland Research Inst., Hurley (England). Soils Plant Nutrition Div.
For primary bibliographic entry see Field 02G.
W74-01997

EFFECTS OF PLASTIC MULCH AND ROW SPACING ON CARROT GROWN NORTH OF LATITUDE 60 DEGREE N,
Department of Agriculture, Morden (Manitoba). Research Station.
G. H. Gubbels.
Can J Plant Sci, Vol 52, No 4, p 660-661, 1972.
Identifiers: Canada, *Carrot, Daucus-carota, Moisture, *Mulch (Plastic), Row spacing, Soils, Temperature, Crop yield.

An experiment was designed to maximize water utilization by covering the entire plot with plastic in such a way that all the water would enter the soil at the base of the plant. Carrot (Daucus carota L., cv. 'Red Cored Chantenay') was used as the test crop. The treatments consisted of spaced rows with and without mulch, and paired rows with mulch. There were no differences between the spaced and paired rows except in the afternoon soil temperature in June. The soil temperatures in the mulched plots were higher than in the unmulched for the morning record in all months. A similar situation was observed with the afternoon record for all months except Sept. Soil temperature differences between mulched and unmulched plots were greatest early in the season but decreased as the days grew shorter and the foliage covered more of the surface area. There was no difference in soil-moisture content between mulched and unmulched plots, but average root weight and yield were greater in the mulched plots. The plastic mulch conserved as much water as possible and made it readily accessible to the plants. This, together with the increased soil temperature, resulted in a 45% increase in yield. Clear polyethylene can be used to increase soil temperature while making maximum use of water in northern latitudes where low soil temperature and moisture often limit plant growth.--Copyright 1973, Biological Abstracts, Inc.
W74-01999

WASTEWATER TREATMENT AND REUSE BY LAND APPLICATION - VOLUME I - SUMMARY,
Metcalf and Eddy, Inc., Palo Alto, Calif.
For primary bibliographic entry see Field 05D.
W74-02043

WASTEWATER TREATMENT AND REUSE BY LAND APPLICATION - VOLUME II,
Metcalf and Eddy, Inc., Palo Alto, Calif.
For primary bibliographic entry see Field 05D.
W74-02044

FIELD STUDIES ON HALO BLIGHT OF BEANS (PSEUDOMONAS PHASEOLICOLA) AND ITS CONTROL BY FOLIAR SPRAYS,
National Vegetable Research Station, Wellesbourne (England).
J. D. Taylor.
Ann Appl Biol, Vol 70, No 3, p 191-197. Illus.
Identifiers: *Beans, Chlorides, Copper, *Foliar sprays, Halo blight, Pseudomonas-phaseolicola, Streptomycin, Sulfates.

In 1968 when conditions were favorable for the spread of infection (rainfall 243 mm June-Aug.), halo blight of beans initiated from 0.38% primary infection produced 33.8% infected pods but in 1969 (rainfall 112 mm June-Aug. + 38 mm irrigation water), similar level of primary infection resulted in only 3.2% infected pods. In both years plant and pod infection were reduced by approximately 90% by sprays of streptomycin sulfate or copper oxychloride (0.1% a.i. (active ingredient) 60 gal/acre (675 l/ha)) applied every 10 days from seedling emergence to flowering time.--Copyright 1973, Biological Abstracts, Inc.
W74-02070

PARAMETRIC MODEL OF RUNOFF IN LOW--LYING AGRICULTURAL LANDS (IN JAPANESE),
Shimane Univ., Matsue (Japan). Faculty of Agriculture.
A. Fukushima.
Bull Fac Agric Shimane Univ. 5 p 76-85. 1971, Illus. (English summary).
Identifiers: *Agricultural lowlands, *Drainage channels, Parametric models, Runoff, *Mathematical models.

The parametric model of rain water flow in the agricultural area is presented and the method of runoff analysis discussed. The mathematical model has 2 parameters which express the conveyance of drainage channel and the initial water storage in the basin. The runoff characteristics, the adaptability of the runoff model and its usefulness are described.--Copyright 1973, Biological Abstracts, Inc.
W74-02076

PRELIMINARY TRIALS WITH HERBICIDES IN IRRIGATED ONIONS AT SAMARU, NIGERIA,
Institute for Agricultural Research, Zaria (Nigeria).
J. H. Green.
Hortic Res. Vol 12, No 2, p 119-125. 1972.
Identifiers: Chloroxuron, Chlorpropham, Control, Crop, Fluorodifen, *Herbicides, Monuron, *Nigeria (Samaru), *Onions, Chlorthal dimethyl, Weeds, Yield, Irrigation.

Between 1968 and 1971, trials were undertaken to compare the effectiveness of chloroxuron, chlorpropham, chlorthal dimethyl, monuron, nitrofen and fluorodifen in an irrigated transplant onion crop in northern Nigeria. The herbicides were compared with a hoed control, and the results indicate that on the bases of yield, crop damage and number of weedings required, chlorthal dimethyl was the most effective material.--Copyright 1973, Biological Abstracts, Inc.
W74-02079

OCCURRENCE OF PHYTOPHTHORA ROOT ROT OF ALFALFA IN WASHINGTON,
Agricultural Research Service, Prosser, Wash. Irrigated Agriculture Research and Extension Center.
J. H. Elgin, Jr., D. W. Evans, and J. M. Kraft.
Plant Dis Rep. Vol 56, No 10, p 830-831. 1972, Illus.
Identifiers: *Alfalfa, Isolation tests, Medicago-Sativa, Pathogenicity tests, *Phytophthora-Megasperma, *Root rot, *Washington.

Chlorotic, severely stunted, 1-yr old alfalfa (Medicago sativa) plants were collected from scattered areas in a poorly drained, irrigated field near Ellensburg, Washington. Roots of many plants were rotted to within 7.5 cm of the crown. Isolates prepared from these roots were identified as Phytophthora megasperma. Two methods used in the isolation and pathogenicity tests are described.--Copyright 1973, Biological Abstracts, Inc.
W74-02080

RESPONSE OF SOYBEANS TO SUBIRRIGATION,
Agricultural Research Service, Thorsby, Ala. Soil and Water Conservation Research Div.
B. D. Doss, and R. W. Pearson.
Soil Sci. Vol 114, No 4, p 264-267. 1972, Illus.
Identifiers: *Irrigation (Subsurface), *Soybeans, Crop yield, Plant growth.

Soybeans responded to irrigation in both plant height and bean yield, but subsurface application did not prove to have any advantage over surface application. Although plants were not allowed to experience moisture stress at any time during the growth cycle in the subirrigated treatment, yields were not significantly higher than for the surface irrigated treatment, and efficiency of water use was much lower. The lower horizons of this soil are too permeable for practical use of subirrigation.--Copyright 1973, Biological Abstracts, Inc.
W74-02082

DIAGNOSTIC TECHNIQUES FOR EVALUATING IRRIGATION WATER QUALITY,
Haryana Agricultural Univ., Hissar (India). Dept. of Soils.
For primary bibliographic entry see Field 05A.
W74-02083

INFLUENCE OF ENVIRONMENT AND LEAF EXCISION ON GAS EXCHANGE OF OAT LEAVES,
Guelph Univ. (Ontario). Dept. of Crop Science.
For primary bibliographic entry see Field 02I.

W74-02084

LAND MANAGEMENT IN RED (CHALKA) SOILS OF TELENGANA,
Indian Council of Agricultural Research, Hyderabad. Southern Regional Soil Conservation Research Centre.
S. Chinnamani, and G. Singh.
Ann Arid Zone. Vol 10, No 4, p 217-224. 1971.
Identifiers: Grading, *India (Telengana), Irrigation, *Land management, *Soils (Red Chalka), Crop yield.

Implementation of modern agricultural technique coupled with cultivation of perennial grass and tree crops will improve productivity of rainfed red soil region. Adoption of soil conservation measures like graded bunding cultivation of high yielding crops, grasses and trees i.e., adoption of mixed farming, is a must in the non-irrigation red soil regions of semi-arid tracts. For dry lands grading was found useful for economy in water and obtaining high crop yield.--Copyright 1973, Biological Abstracts, Inc.
W74-02086

THE INFLUENCE OF DROUGHT ON THE COMPOSITION OF MAIZE SILAGE,
M. Von La Chevallerie, P. L. Van Biljon, P. J. Boshoff, and H. J. Van Der Merwe.
S Afr J Anim Sci. Vol 1, No 1, p 17-21. 1971, (English summary).
Identifiers: *Corn, *Drought, *Maize silage, Meal, Molasses, Urea.

Three morphological types of maize plants were used: normal plants with a good cob development, plants about 1 m high with small cobs and plants with normal vegetative growth but with thin underdeveloped cobs; 40 kg of each sample was ensiled in each of 4 plastic containers. Three additions, urea (1%), maize meal (2.5%) and molasses (2.5%) were compared with a control without any additions. Analyses were done for total N, crude fiber, ether extract, NFE (N-free extract), total soluble- and non-reducing sugars, water soluble N and ammonia N. The thin cob maize plants contained the highest total N whereas the normal plants contained the lowest. The total soluble sugar content was approximately the same for the thin cobbed and normal plants, although the small maize was slightly lower. In general the total N content of the thin cobbed and the small plants silage was higher than in the normal silage. The addition of urea resulted in a higher N content in all cases. The production of steam volatile fatty acids was not noticeably different between all silage samples. Addition of maize meal and molasses had no noticeable influence on the chemical composition of the silage except that in the case of molasses the sugar content of the silage was increased. Maize which had suffered from moisture stress could be used advantageously for making of silage.--Copyright 1973, Biological Abstracts, Inc.
W74-02089

EFFECT OF MINERAL NUTRIENTS ON THE GROWTH, DEVELOPMENT AND PRODUCTIVITY OF COTTON UNDER DIFFERENT WATER SUPPLY CONDITIONS, (IN AZERBAIYAN),
B. Z. Hysejnov, and A. N. Mamedov.
Izv Akad Nauk Az SSR Ser Biol Nauk. 5-6 p 25-27. 1971.
Identifiers: *Cotton production, Growth, Nutrients (Minerals), Water supply.

Mineral nutrients have a favorable effect in both minimum (40%) and optimum (60%) soil moisture conditions. With a minimum water supply the best growth of cotton was observed in the experimental variant N200P200K50, and at an optimal moisture content in the variant N100P200K50.--Copyright 1973, Biological Abstracts, Inc.
W74-02090

THE NEED FOR INTENSIFICATION IN ANIMAL PRODUCTION AND THE CONSEQUENT POLLUTION PROBLEM,
B.O.C.M. Silcock Ltd., Basingstoke (England).
For primary bibliographic entry see Field 05B.
W74-02092

PESTS, CROP DAMAGE AND CONTROL PRACTICES WITH IRRIGATED COTTON IN A TROPICAL ENVIRONMENT,
Commonwealth Scientific and Industrial Research Organization, Canberra (Austrailia). Div. of Land Research.
For primary bibliographic entry see Field 05G.
W74-02093

SOIL WATER AND GROWTH OF RICE AND WEEDS,
Agricultural Research Service, Stuttgart, Ark. Crops Research Div.
R. J. Smith, and W. T. Fox.
Weed Sci. Vol 21, No 1, p 61-63. 1973.
Identifiers: Aeschynomene-Virginica, Brachiaria-Platyphylla, Echinochloa-Crus-Galli, Growth, Oryza-Sativa, *Rice, Sesbania-Exaltata, *Soil water, *Weeds.

In put culture experiments in the greenhouse, rice (Oryza sativa L. 'Nova 66'), red rice (O. sativa L.), barnyardgrass (Echinochloa crus-galli (L.) Beauv.), broadleaf signalgrass (Brachiaria playphylla (Griseb.) Nash), northern jointvetch (Aeschynomene virginica (L.) B.S.P.), and hemp sesbania (Sesbania exaltata (Raf.) Cory) were seeded 1.3, 2.5, 5.1, and 10.2 cm deep in Crowley silt loam which was held at field capacity (24% moisture), saturation (34% moisture), or submerged 1.3 or 5.1 cm. At field capacity and saturation all species seeded 1.3, 2.5 and 5.1 cm deep emerged and grew well; seeding the plants 102. cm deep reduced emergence and growth. Submergence of the soil controlled all weeds effectively but reduced emergence and growth of dry-seeded rice.--Copyright 1973, Biological Abstracts, Inc.
W74-02104

THE WET AND THE DRY: TRADITIONAL IRRIGATION IN BALI AND MOROCCO,
Institute for Advanced Study, Princeton, N.J.
For primary bibliographic entry see Field 06G.
W74-02106

PATTERN OF NEW ROOT PRODUCTION IN PEACH TREES UNDER IRRIGATION,
Victorian Dept. of Agriculture, Tatura (Australia). Horticulture Research Station.
B. Cockroft, and K. A. Olsson.
Aust J Agric Res, Vol 23, No 6, p 1021-1025, 1972, Illus.
Identifiers: *Irrigation, Patterns, *Peach trees, Rapid, *Roots, Trees, Withdrawal, *Australia (Victoria).

A seasonal pattern of new root production is described for peach trees under irrigated conditions in northern Victoria, Australia. The pattern is similar to that described elsewhere for trees growing under natural rainfall or only intermittently irrigated, most root production occurring in spring with little in summer. The low root production in summer even under frequent irrigation is associated with rapid withdrawal of water from the soil following each irrigation. Irrigation criteria are discussed, since soil water levels conventionally considered adequate for leaves and fruit may be inadequate for root production.--Copyright 1973, Biological Abstracts, Inc.
W74-02124

ENGINEERING DESIGN REPORT FOR SPRAY IRRIGATING WASTEWATER FROM THE SANITARY DISTRICT OF BEARDSTOWN AND THE OSCAR MAYER AND CO. MEAT PROCESSING PLANT.
Horner and Shifrin, Inc., St. Louis, Mo.
For primary bibliographic entry see Field 05D.
W74-02126

NITRATE IN SURFACE AND SUBSURFACE FLOW FROM A SMALL AGRICULTURAL WATERSHED,
Agricultural Research Service, Watkinsville, Ga.
For primary bibliographic entry see Field 05B.
W74-02150

04. WATER QUANTITY MANAGEMENT AND CONTROL

4A. Control of Water on the Surface

THE ECONOMIC IMPACT OF BEAVER LAKE RESERVOIR: A COST BENEFIT STUDY,
Arkansas Univ., Fayetteville. Dept. of Economics.
For primary bibliographic entry see Field 06B.
W74-01652

BIOLOGICAL CONTROL OF WATER WEEDS WITH PLANT PATHOGENS,
Florida Univ., Gainesville. Dept. of Plant Pathology.
For primary bibliographic entry see Field 05C.
W74-01653

ENVIRONMENTAL DISTRIBUTION AND METABOLIC FATE OF KEY INDUSTRIAL POLLUTANTS AND PESTICIDES IN A MODEL ECOSYSTEM,
Illinois Univ., Urbana. Dept. of Entomology.
For primary bibliographic entry see Field 05D.
W74-01655

METHODOLOGIES FOR FLOW PREDICTION IN URBAN STORM DRAINAGE SYSTEMS,
Illinois Univ., Urbana. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05D.
W74-01656

SYMPOSIUM ON SIGNIFICANT RESULTS OBTAINED FROM THE EARTH RESOURCES TECHNOLOGY SATELLITE-1, VOL I--TECHNICAL PRESENTATIONS.
For primary bibliographic entry see Field 07B.
W74-01663

NATURAL VEGETATION INVENTORY,
Oregon State Univ., Corvallis. Rangeland Resources Program.
B. J. Schrumpf.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 59-66, 1973. 1 fig, 1 tab, 6 ref.

Descriptors: *Remote sensing, *Satellites (Artificial), *Vegetation, *Mapping, Surveys, Land use, Arid lands, Topography, Terrain analysis, Forest, Grasslands, Data collections, Arizona.
Identifiers: ERTS, *Vegetation identification.

Unique characteristics of ERTS imagery can be used to inventory natural vegetation. While satellite images can seldom be interpreted and identified directly in terms of vegetation types, such types can be inferred by interpretation of physical terrain features and through an understanding of the ecology of the vegetation. (See also W74-01663) (Knapp-USGS)

W74-01671

VEGETATIVE AND GEOLOGIC MAPPING OF THE WESTERN SEWARD PENINSULA, ALASKA, BASED ON ERTIS-1 IMAGERY,
Alaska Univ., College.
J. H. Anderson, L. Shapiro, and A. E. Belon.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 67-75, 1973. 3 fig, 10 ref.

Descriptors: *Remote sensing, *Satellites (Artificial), *Terrain analysis, *Geological mapping, *Vegetation, Mapping, Aerial photography, Ecology, Geology, *Alaska, Data collections, Forests.
Identifiers: ERTS, *Vegetation identification.

ERTS-1 scene 1009-22095 (Western Seward Peninsula, Alaska) was studied to evaluate whether direct visual examination of individual and composite color prints can provide new information of the vegetation and geology of this relatively well known area of Alaska. The vegetation analysis reveals seven major vegetation types, only four of which are described on existing vegetation maps. In addition, the ERTS analysis provides greater detail than the existing maps on the areal distribution of vegetation types. Most of the major rock units and geomorphic boundaries shown on the available geologic maps could also be identified on the ERTS data. Several major high-angle faults were observed, but the zones of thrust faults which dominate the structure of the area are much less obvious. All of the previously mapped granitic intrusive rocks in the area were identifiable on the images; however, a radial drainage pattern about 7 km in diameter, probably indicative of a buried intrusive, was recognized for the first time on the ERTS images. (See also W74-01663) (Knapp-USGS)
W74-01672

ERTS-1 EVALUATION OF NATURAL RESOURCES MANAGEMENT APPLICATIONS IN THE GREAT BASIN,
Nevada Univ., Reno. Remote Sensing Lab.
P. T. Tueller, and G. Lorain.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 77-85, 1973. 2 fig, 5 tab.

Descriptors: *Remote sensing, *Satellites (Artificial), *Great Basin, *Mapping, Vegetation, Terrain analysis, *Nevada, Snow cover, Deserts, Arid lands, Tophgraphy, Crops, Playas, Lakes, Streams, Phreatophytes, Land use, Data collections.
Identifiers: ERTS, *Vegetation identification.

Mountains, valleys, playas, stream courses, canyons, alluvial fans, and other landforms of the Great Basin are readily delineated on ERTS-1 imagery, particularly with MSS-5. Each kind is useful for identifying and studying one or more natural resource features. For example, crested wheatgrass seedings were most easily identified and measured on MSS-7. Color enhancements were useful for depicting meadows and phreatophytic vegetation. Work is underway to inventory and monitor wildfire areas by age and successional status. Playa surfaces, water surfaces, phreatophytic vegetation, snow cover, meadows, and other features of Nevada are being inventoried. Most of this is unavailable from conventional sources and would not be available without the possibility of rapid inventory on ERTS-1 imagery. Vegetation ecotones are being delineated for vegetation mapping. The pinyon/juniper-northern desert shrub ecotone was identified with considerable success. Phenology changes can be used to describe vegetation changes. (See also W74-01663) (Knapp-USGS)

W74-01673

EVALUATION OF ERTS-1 IMAGERY IN MAPPING AND MANAGING SOIL AND RANGE RESOURCES IN THE SAND HILLS REGION OF NEBRASKA,
Nebraska Univ., Lincoln. Dept. of Agronomy.
P. M. Seevers, and J. V. Drew.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 87-89, 1973.

Descriptors: *Remote sensing, *Satellites (Artificial), *Grasslands, *Land use, Mapping, *Nebraska, Grazing, Crops, Great Plains, Irrigation, Data collections.
Identifiers: ERTS, *Sand Hills (Nebr).

High altitude photography of test sites in the Sand Hills of Nebraska was useful for identification of subirrigated range as well as complexes of choppy sands and sands range, which compose approximately 85% of the Sandhills rangeland. These range sites form the basic units necessary for the interpretation of range condition classes used in grazing management. Analysis of ERTS-1 imagery acquired during August, September and October, 1972 indicated potential for the identification of gross differences in forage density within given range sites identified on early season aerial photography. (See also W74-01663) (Knapp-USGS)
W74-01674

MONITORING CALIFORNIA'S FORAGE RESOURCE USING ERTS-1 AND SUPPORTING AIRCRAFT DATA,
California Univ., Berkeley. Forestry Remote Sensing Lab.
D. M. Carneggie, and S. D. DeGloria.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Volume I--Technical Presentations, Sect A, National Aeronautics and Space Administration Report NASA SP-327, p 91-95, 1973.

Descriptors: *Remote sensing, *Satellites (Artificial), *Grasslands, *California, Data collections, Crops, Vegetation, Grazing, Land use, Land management.
Identifiers: ERTS.

NASA's Earth Resources Technology Satellite (ERTS-1) offers unique capabilities for regional monitoring of forage plant conditions. The repetitive coverage every 18 days, the synoptic view, and the real-time recovery of the imagery for immediate analysis combine to make the ERTS satellite a valuable tool for improving the evaluation of rangeland resources. Analysis of the ERTS imagery should reveal the location and size of ranges affected by favorable or unfavorable climatic variables. ERTS imagery can provide the bases for determining the location and extent of potential fire hazard. ERTS data do not provide sufficient resolution to determine the cover or condition of forage plants in most perennial range plant communities. ERTS data provide a permanent record of range conditions. A comparison of ERTS images with aircraft data obtained on previous years reveal the relative difference in range condition between years. ERTS data acquired on a year-to-year basis can provide the first and most effective means for comparing changes in range condition from year to year for large rangeland areas. (See also W74-01663) (Knapp-USGS)
W74-01675

TESTING THE USEFULNESS OF ERTS-1 IMAGERY FOR INVENTORYING WILDLAND RESOURCES IN NORTHERN CALIFORNIA,
California Univ., Berkeley. Forestry Remote Sensing Lab.
D. T. Lauer, and P. F. Krumpe.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 97-104, 1973. 5 fig.

Descriptors: *Remote sensing, *Satellites (Artificial), *Mapping, *Forest, Land use, Vegetation, Data collections, California.
Identifiers: ERTS, *Vegetation identification.

The Forestry Remote Sensing Laboratory at the University of California is testing the usefulness of ERTS-1 imagery for inventorying wildland resources in northern California. Studies are being conducted in two large wildland areas, namely, the Feather River Watershed and the Northern Coastal Zone. Within the Davis Lake study area specific resource type identification could be done at a level of accuracy of 65% and broad resource type identification at 70%. Within the Bucks Lake study area, boundaries between contrasting forest types were properly mapped by image interpretation on ERTS-1 imagery. The ERTS-1 imagery yielded less detailed information than conventional aerial photographs at the Bucks Lake study area, but the image interpretation was done much more cheaply. At the San Pablo Reservoir area, a skilled image analyst could identify woody vegetation with better than 86% accuracy. (See also W74-01663) (Knapp-USGS)
W74-01676

ERTS-1 IMAGERY AND HIGH FLIGHT PHOTOGRAPHS AS AIDS TO FIRE HAZARD APPRAISAL AT THE NASA SAN PABLO RESERVOIR TEST SITE,
California Univ., Berkeley. Space Sciences Lab.
R. N. Colwell.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 145-156, 1973. 8 fig.

Descriptors: *Remote sensing, *Satellites (Artificial), *Forest fires, *Hazards, *Surveys, Mapping, *California, Frost, Data collections.
Identifiers: ERTS, *Berkeley (Calif), Eucalyptus trees.

ERTS imagery when used with limited amounts of aerial photography and direct onsite observation can greatly facilitate the making of fire-hazard appraisals. Some unusual circumstances are combining to produce a condition of critical fire hazard in many parts of California. The hazard is especially great in a very hilly portion of the NASA San Pablo Reservoir Test Site, immediately east of the Oakland-Berkeley metropolitan complex. More than 8 million eucalyptus trees were planted in the Oakland-Berkeley hills along a 25-mile ridgeline. These trees can constitute a very real hazard even under normal climatic conditions and an extreme fire hazard under abnormal climatic conditions. The test site area is in the wettest rainy season in history. Consequently the wild oats and other herbaceous annuals are growing now more luxuriantly than ever before. By the summer of 1973, when such vegetation will have turned brown and become tinder dry, it probably will constitute the largest volume of flash fuels that the rangelands in this area have ever known. The coldest winter temperatures in recorded history damaged many eucalyptus trees. The tall dense eucalyptus timber stands with their tremendous crown canopies are tinder-dry foliage loaded with volatile oils. By examination of ERTS imagery it has been possible to select areas in which vegetation stress was developing to the point where a closer look with aerial photography was warranted. (See also W74-01663) (Knapp-USGS)
W74-01681

PHENOLOGY SATELLITE EXPERIMENT,
Cornell Univ., Ithaca, N.Y. Div. of Atmospheric Sciences.
B. E. Dethier, M. D. Ashley, B. Blair, and R. J. Hopp.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 157-165, 1973. 5 fig.

Descriptors: *Remote sensing, *Satellites (Artificial), *Phenology, *Forests, Surveys, Data collections, Mapping, Crops, Growth stages, Ecology, Habitats.
Identifiers: ERTS.

A phenological event (the brown wave-vegetation senescence) for forests and crops was detected using ERTS-1 imagery. Data handling techniques included computer analysis and photo interpretation procedures. Computer analysis of ERTS-1 multispectral scanner digital tapes in all bands was used to give the relative changes of spectral reflectance with time of forests and specified crops. These data were obtained for a number of the study's 24 sites located within four north-south corridors across the United States. The recession of vegetation development can be detected very well. Specific phenological events such as crop maturity or leaf fall can be mapped for specific sites and possibly for entire regions. Preliminary analysis based on a number of samples in mixed deciduous hardwood stands indicate that as senescence proceeds, both the rate of change and differences in color among species can be detected. This will permit timber surveys by species over large areas and the determination of conditions of wildlife habitats. (See also W74-01663) (Knapp-USGS)
W74-01682

FOREST AND RANGE MAPPING IN THE HOUSTON AREA WITH ERTS-1 DATA,
Lockheed Electronics Co., Inc., Houston, Tex. Houston Aerospace Systems Div.
G. R. Heath, and H. D. Parker.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 167-169, 1973. 6 fig, 1 tab.

Descriptors: *Remote sensing, *Satellites (Artificial), *Forests, *Mapping, *Grazing, Marshes, Grasses, Surveys, Data collections, *Texas.
Identifiers: ERTS, *Vegetation identification, Spartina.

ERTS-1 data acquired over the Houston area were analyzed for applications to forest and range mapping. The Sam Houston National Forest (Texas) was chosen as a test site. Conventional imagery interpretation as well as computer processing methods were used to make classification maps of timber species, condition and land use. The results were compared with timber stand maps which were obtained from aircraft imagery and checked in the field. Conventional interpretation techniques indicated an accuracy in classification of 63%. The computer-aided interpretations made by a clustering technique gave 70% accuracy. Computer-aided and conventional multispectral analysis techniques were applied to range vegetation type mapping in the gulf coast marsh. Two species of salt marsh grasses were mapped. Marshhay cordgrass and gulf cordgrass mark a change in elevation as small as three inches above sea level. The two types are separable in ERTS-1 MSS data, both manually and automatically. (See also W74-01633) (Knapp-USGS)
W74-01683

EVALUATION OF ERTS-1 IMAGERY FOR GEOLOGICAL SENSING OVER THE DIVERSE

GEOLOGICAL TERRANES OF NEW YORK STATE,
Geological Survey, Albany, N.Y.; and New York State Museum and Science Service, Albany.
For primary bibliographic entry see Field 07C.
W74-01690

GEOLOGY OF UTAH AND NEVADA BY ERTS--1 IMAGERY,
Utah Univ., Salt Lake City. Dept. of Geological and Geophysical Sciences.
For primary bibliographic entry see Field 07C.
W74-01692

PRELIMINARY GEOLOGIC APPLICATION OF ERTS-1 IMAGERY IN ALASKA,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 07C.
W74-01693

A COMPARISON OF GEMINI AND ERTS IMAGERY OBTAINED OVER SOUTHERN MOROCCO,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
For primary bibliographic entry see Field 07C.
W74-01694

A STUDY OF MORPHOLOGY, PROVENANCE, AND MOVEMENT OF DESERT SAND SEAS IN AFRICA, ASIA, AND AUSTRALIA,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 07C.
W74-01697

MAPPING QUATERNARY LANDFORMS AND DEPOSITS IN THE MIDWEST AND GREAT PLAINS BY MEANS OF ERTS-1 MULTISPECTRAL IMAGERY,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 07C.
W74-01702

PRELIMINARY GEOLOGIC INVESTIGATIONS IN THE COLORADO PLATEAU USING ENHANCED ERTS IMAGES,
Jet Propulsion Lab., Pasadena, Calif.
For primary bibliographic entry see Field 07C.
W74-01708

ERTS APPLICATIONS IN EARTHQUAKE RESEARCH AND MINERAL EXPLORATION IN CALIFORNIA,
Rockwell International Corp., Thousand Oaks, Calif. Science Center.
For primary bibliographic entry see Field 07C.
W74-01711

SOME ASPECTS OF ACTIVE TECTONISM IN ALASKA AS SEEN ON ERTS-1 IMAGERY,
Alaska Univ., College. Geophysical Inst.
For primary bibliographic entry see Field 07C.
W74-01712

WATER MANAGEMENT USING SUBSURFACE DRAINS,
North Carolina State Univ., Raleigh. Dept. of Biological and Agricultural Engineering.
For primary bibliographic entry see Field 03F.
W74-01717

REDUCING SEEPAGE FROM STOCK TANKS WITH UNCOMPACTED, SODIUM-TREATED SOILS,
Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
R. J. Reginato, F. S. Nakayama, and J. B. Miller.
Journal of Soil and Water Conservation, Vol 28, No 5, p 214-215, September - October 1973. 3 ref.

Descriptors: *Seepage, *Seepage control, *Soil treatment, Soil sealants, Sodium, Soil water movement, Ion exchange, *Carbonates.

Seepage from many stock tanks in calcium-aggregated soils can be greatly reduced by treating the soil with sodium carbonate without compaction. The proper amount of sodium carbonate (determined by soil analysis) is broadcast on the soil and mixed into the top 3 to 5 inches. Seepage losses were reduced from 5 inches a day to 0.15 inch a day in field tests. (Knapp-USGS)
W74-01718

SOME FEATURES OF THE HYDROLOGIC REGIMEN OF SARATOV RESERVOIR (NEKOTORYYE CHERTY GIDROLOGICHESKOGO REZHIMA SARATOVSKOGO VODOKHRANILISHCHA),
Akademiya Nauk SSSR, Moscow. Institut Biologii Vnutrennykh Vod.
Yu. I. Gorin.
In: Organicheskoye veshchestvo i elementy gidrologicheskogo rezhima volzhskikh vodokhranilishch; Akademiya Nauk SSSR Institut Biologii Vnutrennikh Vod Trudy, No 23 (26), p 193-198, Leningrad, 1972. 3 fig, 3 tab, 2 ref.

Descriptors: *Reservoirs, *Reservoir construction, *Regimen, *Hydrologic cycle, Water balance, Inflow, Discharge (water), Runoff, Water levels, Water level fluctuations, Flow, Temperature, Hydroelectric plants, Water works, Seasonal.
Identifiers: *USSR (Saratov Reservoir), Volga River.

Investigations were carried out in 1965-70 to study changes in hydrologic characteristics of the Volga in the Tol 'yatti-Balakovo reach following construction of the Kuybyshev and later the Saratov waterworks. Filling of the Saratov Reservoir caused significant changes in the hydrologic regimen of the Volga in the Tol 'yatti-Balakovo reach. On the basis of water-level fluctuations, flow-velocity distribution, and temperature, the Saratov Reservoir can be divided into 2 reaches (lake-river and lake) and, on the basis of morphometric parameters, into the Kuybyshev, Syzran', Khvalynsk, and Balakovo pools. (See also W74-01723) (Josefson-USGS)
W74-01728

ACREAGE INCREASE DUE TO SLOPE,
Soil Conservation Service, Portland, Oreg.
E. W. Anderson.
J Range Manage, Vol 25, No 4, p 316-317, 1972.
Identifiers: Acreage increase, Animals, Damage, Grazing, *Management, *Resource planning, *Slopes (Steep sites).

It is imperative in resource planning and management of very steep areas to fully consider and provide for stability of the resource. Some very steep sites remain stable under judicious grazing use. Others are affected detrimentally merely by having animals walk across them.--Copyright 1973, Biological Abstracts, Inc.
W74-01746

EFFECTS OF IRRIGATION ON THE PRODUCTION AND YIELDS OF SPECIALIZED POPLAR GROVES ON A TREE FARM IN THE PIEDMONT PLAINS, (IN ITALIAN),
Instituto di Sperimentazione per la Pioppicoltura, Casale Monferrato (Italy).
M. Prevosto.
Cellul Carta. Vol 23, No 4, p 3-22, 1972. Illus. (English summary).
Identifiers: Irrigation, *Italy (Piedmont plains), Marsonnina-Brunnea, Piedmont, Plains, *Poplar, Production, Tree farms, Parasites, Yields.

To estimate the effects of irrigation on stands having different spacings, an investigation was started in 1963 on a poplar plantation of the clone I-214 established in 1959, having spacings of 3 x 3 m, 4 x 4 m, 5 x 5 m, and 6 x 6 m, which had received 2 irrigations/yr to the 4th yr of 1200 m3/ha each. The tested treatments were: AO, no irrigation; A2, 2 irrigations/yr of 1200 m3 each, supplied during May and July; A4, 4 irrigations/yr of 1200 m3 each, supplied during May, June, July and Aug. The test was complicated by the fungus interference of Marssonina brunnea. Attempts were made to estimate the importance of this parasite by comparing the results with others in similar poplar plantations of the same farm, felled before its appearance. In the absence of the parasite the lack of irrigation shortened the period of the greatest volume-production at the wider spacings, reducing annual wood production from 14-15% to 20-25% according to the spacing. There were no significant differences in wood production between 2 or 4 irrigations/yr. The cessation of irrigations from the 5th year and the presence of M. brunnea reduced the average annual increments 5-9% at the narrower spacings and 15-20% at the wider ones. In irrigated plantations infected by Marssonina, the parasite did not modify the duration of the period of the greatest volume production at any spacing as compared to the noninfected ones. In some cases, the cessation of irrigation as well as the disease attacks had less serious consequences in the denser stands.--Copyright 1973, Biological Abstracts, Inc.
W74-01755

CLIMATE AND GRASSLANDS IN SOUTH AMERICA, (IN SPANISH),
For primary bibliographic entry see Field 02B.
W74-01781

FLOOD MITIGATION VERSUS POPLAR GROWING AS ALTERNATIVE PUBLIC INVESTMENTS: A CASE STUDY,
For primary bibliographic entry see Field 06B.
W74-01832

ENVIRONMENTAL SURVEY OF THE TETON RIVER AND HENRY'S FORK OF THE SNAKE RIVER,
Idaho Univ., Moscow. Water Resources Research Inst.
K. E. Holte, B. L. Keller, S. H. Merriam, G. W. Minshall, and M. G. Pavesic.
Technical completion report WRRI Code No USCE 44-418, December 1972. 271 p, 31 fig, 46 tab, 70 ref, 7 append. USCE DACW 68-72-C-0210.

Descriptors: *Water resources development, *Watersheds (Basins), *Environmental effects, *Water utilization, Idaho, Irrigation, Water management (Applied), Streamflow, Groundwater recharge, Water injury, Land use, Lumbering, Recreation, Agriculture, Grazing, Flood control, Human population, Archaeology, Tourism, Economic impact, Income, Competing uses, Comprehensive planning, Erosion control, Vegetation, Birds, Mammals, Wildlife, Habitats, Reptiles, Amphibians, Fish, Regional economics.
Identifiers: *Snake River Basin (Idaho), Demography, Ethnography.

Selected environmental factors related to the water resources in the watershed drained by the Henry's Fork and Teton Rivers and their tributaries were inventoried using the following methods: An investigative overflight, on-the-ground visitations, interviews with area professionals and laymen, and a search of literature. The effects of various forms of water development, utilization, or management upon the related environmental conditions were considered. The evaluations are summarized in a list of recommendations concerning future water resources development. Specifically, no further development should occur without intensive investigations weighing all consequences of such development. An economic evaluation of current and possible future activities of humans, fauna and flora of Fremont, Madison, and Teton Counties, Idaho is presented in the appendix. (Weaver-Wisconsin)
W74-01839

REPORT ON THE HARVARD PROGRAM OF RESEARCH IN WATER RESOURCES DEVELOPMENT,
Harvard Univ., Cambridge, Mass.
For primary bibliographic entry see Field 06B.
W74-01846

OPEN SPACE: PRELIMINARY PLAN.
Los Angeles Dept. of City Planning, Calif.
For primary bibliographic entry see Field 06G.
W74-01849

WATER MANAGEMENT.
Orange-Seminole-Osceola Planning Commission, Orlando, Fla.
For primary bibliographic entry see Field 06F.
W74-01850

REGULATING FLOOD-PLAIN DEVELOPMENT,
Chicago Univ., Ill. Dept. of Geography.
For primary bibliographic entry see Field 06F.
W74-01851

MISSISSIPPI/MINNEAPOLIS-A PLAN AND PROGRAM FOR RIVERFRONT DEVELOPMENT.
Riverfront Planning Team of Minneapolis Planning and Development, Minn.
For primary bibliographic entry see Field 03D.
W74-01855

NORTH CAROLINA WATER PLAN--PROGRESS REPORT, CHAPTER 26--BROAD RIVER BASIN--VOL. I.
North Carolina Dept. of Natural and Economic Resources, Raleigh. Office of Eater and Air Resources.
For primary bibliographic entry see Field 06B.
W74-01858

NORTH CAROLINA WATER PLAN-PROGRESS REPORT: CHAPTER 44, THE APPALACHIAN REGION IN NORTH CAROLINA.
North Carolina State Dept. of Water and Air Resources, Raleigh.
For primary bibliographic entry see Field 06B.
W74-01859

NORTH CAROLINA WATER PLAN-PROGRESS REPORT CHAPTER 25, THE CONCEPT OF BASIN AND REGION REPORTS IN THE NORTH CAROLINA WATER PLAN.
North Carolina State Dept. of Water and Air Resources, Raleigh.
For primary bibliographic entry see Field 06B.
W74-01860

SOUTHERN TIER EAST REGIONAL PLAN, BROOME-TIOGA COUNTIES, PRIORITIES FOR THE RIVERBANKS PLAN.
Egner and Niederkorn Associates, Inc., Ithaca, N.Y.
For primary bibliographic entry see Field 06B.
W74-01871

SOUTHERN TIER EAST REGIONAL PLAN, BROOME-TIOGA COUNTIES, RECREATION, OPEN SPACES, RIVERBANKS.
Egner and Niederkorn Associates, Inc., Ithaca, N.Y.
For primary bibliographic entry see Field 06B.
W74-01872

FLOOD PLAIN INFORMATION, RABBIT CREEK, ANCHORAGE, ALASKA.
Army Engineer District, Anchorage, Alaska.
For primary bibliographic entry see Field 06F.
W74-01873

ANALYSIS OF COAL REFUSE DAM FAILURE, MIDDLE FORK BUFFALO CREEK, SAUNDERS, WEST VIRGINIA--VOLUME 2, APPENDICES.
Wahler (W.A.) and Associates, Palo Alto, Calif.
For primary bibliographic entry see Field 08A.
W74-01939

MATHEMATICAL SIMULATION OF SALINITY IN THE SACRAMENTO ROVER SYSTEM,
California State Dept. of Water Resources, Sacramento.
For primary bibliographic entry see Field 05B.
W74-01944

FLOOD CONTROL PROJECT MAINTENANCE AND REPAIR -- 1971 INSPECTION REPORT,
California State Dept. of Water Resources, Sacramento.
For primary bibliographic entry see Field 08D.
W74-01945

FLOOD PLAIN INFORMATION, KENAI RIVER, PHASE I, KENAI PENINSULA BOROUGH, ALASKA.
Army Engineer District, Anchorage, Alaska.

Prepared for the Kenai Peninsula Borough Report, June 1973. 26 p, 12 fig, 20 plate, 2 tab.

Descriptors: *Flood data, *Flood plains, *Alaska, *Flood forecasting, Flood profiles, Aerial photography, Topography, Floods, Streamflow, Flow rates, Peak discharge, Flood damage, Ice jams, Ice breakup, Snowmelt.
Identifiers: *Kenai Peninsula Borough (Alaska), Intermediate Regional Flood, Standard Project Flood.

The portion of the Kenai Peninsula Borough, Alaska, covered by this report is subject to flooding from the Kenai River. The properties along this stream are primarily residential and recreational and were moderately damaged by the floods of 1964 and 1969. The areas in the flood plain which are now under pressure for future development are extensive. Although large floods have occurred in the past, studies indicate that even larger floods are possible. During the Intermediate Regional and Standard Project Floods, average velocities of main-channel flow is about 7.5 and 9 feet per second, respectively. Velocities of this magnitude are sufficient to cause severe erosion to banks, move structures off their foundations, transport vehicles, and cause similar damages. Overbank flow would average 1 fps. In the case of an ice jam flood, flood waters will generally rise rapidly and recede rapidly when the ice jam breaks. The levels that the Intermediate Regional Flood and Standard Project Flood are expected to reach at various locations in the area are indicated on photographs. (Woodard-USGS)
W74-01952

INTERNATIONAL SYMPOSIUM ON HYDROLOGY OF WATERLOGGED AREAS (MEZHDUNARODNYY SIMPOZIUM PO GIDROLOGII ZABOLOCHENNYKH TERRITORIY),
For primary bibliographic entry see Field 02G.
W74-01963

USE AND CONSERVATION OF WATER RESOURCES IN LITHUANIA (ISPOL'ZOVANIYE I OKHRANA VODNYKH RESURSOV LITOVSKOY SSR),
For primary bibliographic entry see Field 04B.
W74-01970

SIMPLIFIED APPARATUS FOR DETERMINING LEAF WATER POTENTIALS IN PINE NEEDLES,
New Zealand Forest Service, Rotorua.
For primary bibliographic entry see Field 02I.
W74-02075

ARCEUTHOBIUM PUSILLUM: MOISTURE REQUIREMENTS FOR GERMINATION AND RADICLE GROWTH,
Maritimes Forest Research Center, Fredericton (New Brunswick).
For primary bibliographic entry see Field 02I.
W74-02088

FURTHER STUDIES ON THE HYDROGRAPHY AND CHEMISTRY OF LAKE MANZALAH,
Alexandria Inst. of Oceanography and Fisheries (Egypt).
For primary bibliographic entry see Field 02H.
W74-02096

OPTIMAL ALLOCATION OF WATER RESOURCES IN UTAH,
Utah Water Research Lab., Logan.
C. G. Clyde, and A. B. King.
Journal of the Hydraulics Division, American Society of Civil Engineering, Vol 99, No HY10, Proceedings paper No. 10088, p 1777-1794, October 1973. 9 fig, 4 tab, 7 ref. OWRR B-027-UTAH (2).

Descriptors: Water supply development, *Water demand, *Utah, *Water allocation (Policy), *Linear programming, Optimization, Economics, Water transfer, Groundwater, Water requirements, Water management (Applied), Constraints, Computer programs, State governments, Planning, Systems analysis, Mathematical models, *Colorado River basin, Alternative planning.
Identifiers: *Cost minimization, Simplex method, Statewide water systems, Shadow prices, Cost control, Sensitivity analysis, Parametric analysis.

Mathematical analysis of complex water resource systems is extended to a statewide system. A number of alternative patterns and levels of demand for water are postulated for ten interconnected hydrologic study areas in the state of Utah. The costs of meeting the projected demands are minimized utilizing a linear programming model of the economic-hydrologic-physical system. The comprehensive model considers virtually all uses, areas, sources, transfers, and costs of water; it has 204 constraints and 338 variables and is solved by the simplex method. Results show that the optimal least-cost system consists of the various combinations of groundwater, surface water, and interregional transfer activities which minimize the cost. Also included in the results are: Shadow prices of the resources; sensitivity analyses to identify the critical cost coefficients in the optimal solution; parametric analyses to test the effects of changing constraints; and manipulations of the model to test operating rules, legal policies, political factors, institutional limitations, etc. Flow diagrams and graphs summarize the important information. The method developed in this study allows consideration of the full cost structure, rather than just part of the development costs. (Bell-Cornell)
W74-02117

REGIONAL LAND USE PLAN, 1973, FOR HANCOCK, HARRISON, PEARL RIVER, JACKSON COUNTIES, MISSISSIPPI.
Gulf Regional Planning Commission, Gulfport, Miss.

May 15, 1973. 65 p, 8 fig, 2 tab, 50 ref, 1 append. MS-04-25-1001.

Descriptors: *Regional development, *Marsh management, *Tidal marshes, *Land use, *Gulf coastal plain, Comprehensive planning, Future planning (Projected), *Mississippi, Urbanization, Forecasting, Long-term planning, Land development, Land resources.

The Gulf Regional Planning Commission, located in southeastern Mississippi, has developed a land use plan to help guide future development. The plan is designed to: (1) encourage planned new communities, (2) control pollution, (3) establish permanent open spaces on a regional basis, (4) preserve historic sites and other significant structures and places, (5) conserve natural resources, (6) provide for diversified growth, and (7) provide an adequate environment for all people. A land use survey was performed by canvassing the entire study area to determine existing structures and land use. This information was then transferred to maps and coded with particular attention being given to the tidal marsh areas. A master land use plan was then prepared for each county. Land use classifications include: (1) residential, (2) commercial, (3) industrial, (4) public, (5) rights-of-way, (6) NASA and military, and (7) water and unclassified. In all cases, large areas have been classified for agriculture, forestry, and resource conservation. This will help insure the preservation of such areas in conjunction with future development. (Poertner)
W74-02120

FLOOD PLAIN INFORMATION, PASCAGOULA-GAUTIER COASTAL AREAS, JACKSON COUNTY, MISSISSIPPI.
Army Engineer District, Mobile, Ala.

Prepared for the Gulf Regional Planning Commission, Gulfport, Mississippi, June 1970. 46 p, 22 fig, 4 tab.

Descriptors: *Hurricanes, *Maximum probable flood, *Coastal plains, *Data collections, *Tidal waters, *Mississippi, Standard project flood, Land use, Flood plains, Flood profiles, Flood damage, Flood forecasting, Flood data, Flood peak, Flood frequency, Flood stanges.
Identifiers: *Jackson County (Mississippi).

The Pascagoula-Gautier coastal area in eastern Mississippi has experienced severe flooding problems from tidal floods. Without presenting any solutions, this report studies past flood characteristics, their extent and probable future floods. Future floods are classified into two areas of concern: the intermediate regional tidal flood, which has a recurrence interval of about 100 years, and the standard project tidal flood which has an extremely rare occurrence interval. The latter can be used to establish upper limits for practical flood control. The area covered in the study includes the City of Pascagoula and is rectangular in shape, extending 19 miles in an east-west direction and 6 miles north-south. The major cause of flooding is from hurricane tides or severe southerly storm tides. The most severe flood known to have occurred happened on August 17, 1969 during Hurricane Camille when damage in Jackson County total about $50 million and high water reached a level of 12.7 feet above mean sea level. The hurricane season lasts from June to November. The most severe storms usually occur in August and September. Damage is often due to relatively short-lived flooding accompanied by high water velocities. At the present time, there are no federal flood control structures in the area and none are planned. (Poertner)
W74-02121

WATER IN MISSISSIPPI,
Geological Survey, Jackson, Miss. Water Resources Div.
B. E. Ellison.
Mississippi Board of Water Commissioners, Jackson, 1971. 47 p, 47 fig.

Descriptors: *Water users, *Education, *Mississippi, *Water utilization, Hydrology, Water demand, Water supply, Planning, Water resources development, Water pollution, Flooding, Water table, Water chemistry, Flood damage, Water requirements.

This booklet was prepared to meet the needs of children in junior high school and lower grades to understand some of the elementary facts of water use and supply. The importance of water to all sectors of society--municipalities, industry and agriculture--is explained. Listings are included of the quantities of water used and descriptions are given of water use and usage. The chemistry and hydrologic cycle of water are described. Besides the beneficial uses of water, the destructiveness of floods and pollution are outlined. The use of water by the Indians and early settlers is given along with the probable future requirements for water. The booklet is freely illustrated to add interest to the subject matter. (Poertner)
W74-02122

FLOOD PROTECTION FOR MISSOURI BOTTOMS.
Horner and Shifrin, Inc., St. Louis, Mo.

Prepared for Business and Industrial Development Commission, St. Louis County, Missouri, May 12, 1967. 53 p, 17 fig.

Descriptors: *Flood protection, *Missouri River, *Land development, Land use, *Future planning (Projected), *Missouri, Census, Forecasting, Cost-benefit analysis, Feasibility studies, Levees, Industrial plants, Urbanization.
Identifiers: *St. Louis County (Missouri), Future growth, Industrial expansion, Corps of Engineers.

Rapid industrialization in St. Louis County, Missouri has used up much of the available good industrial land. It was estimated that by the end of 1973 there would be a severe shortage of land for industrial development. The search for suitable land includes the investigation of Missouri River bottom land for this purpose. A prime consideration in the use of this land is flood protection. The Corps of Engineers has tentative plans which include the construction of two levees that would provide an additional 22,000 acres of industrial land. Investigation showed that the total local cost for constructing the levees would be about $3 million, making this land an attractive prospect. Sponsorship of the projects is recommended, with the present Monarch-Chesterfield Levee District assuming the administrative role. Construction of the levees will also include the construction of drainage control facilities for the area and regulation of discharges on the Missouri River. The design height for the levees will be based on the controlled river discharge for the 100-year river flow plus an additional feet and a 3-foot freeboard for protection against wave action. This height is estimated to be equivalent to protection for a 700 to 800-year river level and should provide adequate protection for all types of industry. (Poertner)
W74-02128

WATER AND THE LAND: OPPORTUNITIES AND PROBLEMS IN FORSYTH, NORTH CAROLINA.
City-County Planning Board, Winston-Salem, N.C.

October 1969. 51 p, 6 fig, 3 tab, 58 ref, 5 append.

Descriptors: *Flood control, *Non-structural alternatives, *Flood protection, Flood plains, *North Carolina, Watershed management, Flood damage, Erosion control, Floodproofing, Legislation, Building codes.
Identifiers: *Forsyth County (NC), *Winston-Salem (NC).

Forsyth County, located in northwestern North Carolina, has no major rivers nor catastrophic floods; but flooding is a problem of major concern. The hazard of flooding is growing in the county as more areas are being urbanized. The urbanization increases the amount of impervious area, thereby increasing the volume of flood water that must be handled. During construction periods the denuded soil is often eroded, causing reductions in channel capacity due to sedimentation. Only a few preventive measures have been taken to reduce the hazards of flooding, such as flood plain zoning in some areas, dredging of various stream beds, installation of artificial drainage ditches, and promotion of methods of conservation. But some areas--notably the City of Winston-Salem--need to establish additional corrective and preventive measures such as flood plain ordinances and floodproofing codes. Additional studies are recommended to supplement those already compiled, or now in effect. Both direct and indirect benefits will accrue to the public from programs to reduce flood hazards. (Poertner)
W74-02129

WATER SUPPLY AND SEWERAGE SERVICES: TOOLS FOR AFFECTING THE QUALITY OF LIFE IN FORSYTH COUNTY, N.C., VOLUME D IN THE LAND POTENTIALS SERIES.
City-County Planning Board, Winston-Salem, N.C.
For primary bibliographic entry see Field 05D.
W74-02130

UNITARY WATER SUPPLY AND SEWERAGE SERVICES.
City-County Planning Board, Winston-Salem, N.C.
For primary bibliographic entry see Field 05D.
W74-02131

4B. Groundwater Management

SURVEY OF INDUSTRIAL WASTE INJECTION WELLS, VOLUME III,
Missouri Univ., Rolla. Dept. of Geological Engineering.
For primary bibliographic entry see Field 05E.
W74-01714

SUMMARY GROUND-WATER RESOURCES OF CLARION COUNTY, PENNSYLVANIA,
Geological Survey, Harrisburg, Pa. Water Resources Div.
T. G. Newport.
Pennsylvania Geological Survey Bulletin W32, 1973. 42 p, 6 fig, 1 plate, 7 tab, 9 ref.

Descriptors: *Groundwater resources, *Aquifer characteristics, *Water wells, *Water quality, *Pennsylvania, Hydrologic cycle, Hydrogeology, Water yield, Petrology, Land use, Human population, Water pollution sources, Acid mine water, Coal mines.

The geologic formations in Clarion County, Pennsylvania, range from the Mississippian Pocono Group to Quaternary alluvium along some of the major streams. Data from more than 70 wells drilled in the county indicate that the highest groundwater yields are obtained from aquifers in the Pocono Group and in the alluvium deposits. Water in the sandstone and limestone aquifers of the consolidated rocks occurs in pore spaces and in secondary openings such as fractures and solution channels. Yields from sandstone in the Pocono Group vary widely, depending on the amount of shale interbedded. Yields of less than 50 gpm to over 500 gpm have been reported. In the Pottsville Group, the average yield is 28 gpm, but if the wells penetrate both the upper and lower sandstone members, the yield may be much higher. The sandstone and limestone members of the Allegheny Group are reliable sources of small to moderate amounts of groundwater and will yield adequate amounts for domestic use at almost any location drilled. Excessive iron is the main water quality problem in groundwater of Clarion County. Groundwater in the deeper aquifers is generally highly mineralized. In some areas, acid water from coal mines has drained into aquifers. (Woodward-USGS)
W74-01721

THE INFLUENCE OF A CHEMICAL PLANT SEWAGE SEDIMENTATION CATCHPIT ON GROUNDWATERS OF THE UPPER VISTULA FLOODPLAIN,
Academy of Mining and Metallurgy, Krakow (Poland). Inst. of Hydrogeology and Engineering Geology.
For primary bibliographic entry see Field 05B.
W74-01754

GEOLOGY OF MERCER AND OLIVER COUNTIES, NORTH DAKOTA,
Geological Survey, Grand Forks, N. Dak.
C. G. Carlson.
North Dakota Geological Survey Bulletin 56, Part I, and North Dakota State Water Commission County Groundwater Studies 15, Part I, 1973. 72 p, 23 fig, 4 plate, 3 tab, 34 ref, 2 append.

Descriptors: *Geology, *Groundwater resources, *Hydrogeology, *Geological surveys, *North Dakota, Geologic mapping, Aquifers, Geologic formations.
Identifiers: Mercer and Oliver Counties (N Dak).

The geology of Mercer and Oliver Counties, an area of 1,817 square miles located in west-central North Dakota, as described. The primary purposes of this study are: (1) to provide a geologic map of the area, (2) to interpret the geologic history of the area, (3) to locate and define aquifers, and (4) to determine the location and extent of other natural resources in these counties. Groundwater is obtained from both glacial drift and bedrock aquifers with most of the water obtained from bedrock. Lignite beds and sands in the Sentinel Butte and Tongue River Formations provide shallow bedrock aquifers in most areas. Sandstones near the base of the Tongue River Formation and within the Hell Creek and Fox Hills Formation provide deeper artesian aquifers in many areas. Glacial drift is generally too thin or impermeable to provide good aquifers in the upland areas. However, in the valleys of the major streams and in the diversion channels, the glacial and alluvial fill may provide adequate supplies of groundwater. (Woodard-USGS)
W74-01887

BIOLOGICAL INCRUSTATION OF WELLS DUE TO MASS DEVELOPMENT OF IRON AND MANGANESE BACTERIA,
Bundesgesundheitsamt, Berlin (West Germany). Institut fuer Wasser-, Boden-, und Lufthygiene.
For primary bibliographic entry see Field 05B.
W74-01902

BIBLIOGRAPHY AND INDEX OF OKLAHOMA GEOLOGY--1972,
Geological Survey, Norman, Okla.
For primary bibliographic entry see Field 02F.
W74-01916

THAT SINKING FEELING,
National Oceanic and Atmospheric Administration, Washington, D.C.
For primary bibliographic entry see Field 02F.
W74-01920

WATER RESOURCES OF THE RUSTON AREA, LOUISIANA,
Geological Survey, Baton Rouge, La.
T. H. Sanford, Jr.
Louisiana Department of Public Works Water Resources Technical Report No 8, 1973. 33 p, 7 fig, 1 plate, 8 tab, 14 ref.

Descriptors: *Water resources, *Surface waters, *Groundwater resources, *Hydrologic data, *Louisiana, Water wells, Aquifer characteristics, Water yield, Drawdown, Water levels, Hydrogeology, Water quality, Water supply, Lakes, Water treatment.
Identifiers: *Ruston area (La).

Groundwater, the present source of water supply in the Ruston, Louisiana, area is adequate to meet the present and projected needs through the year 2000, despite the proposed large increase in groundwater use at nearby Hodge. The principal aquifer, the Sparta Sand, is the only aquifer capable of yielding large quantities of freshwater in this area. The water level at Ruston has declined 175 feet since 1920; most of this decline is attributed to industrial pumpage at El Dorado, Ark., and at Monroe, Bastrop, and Hodge, La. Aquifer dewatering, which began in the mid-1960's, will increase the yield from storage manyfold, and thus the rate of water-level drawdown will decrease significantly. The quality of water from the Sparta is generally good, but treatment is required for a 'red water' problem believed to be caused by a combination of slightly corrosive water and iron bacteria in the water system. As an alternative or complementary source, Bayou D'Arbonne Lake, 15 miles northeast of Ruston, can supply water of good quality. The lake has a capacity of 130,000 acre-feet (42.2 billion gallons) and can supply about 200 million gallons per day of water. (Woodard-USGS)
W74-01921

GEOLOGY OF BURKE COUNTY, NORTH DAKOTA,
Geological Survey, Grand Forks, N. Dak.
For primary bibliographic entry see Field 02F.
W74-01923

INVESTIGATION OF RELIEF WELLS, MISSISSIPPI RIVER LEVEES, ALTON TO GALE, ILLINOIS,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Soils and Pavements Lab.
R. L. Montgomery.
Available from NTIS, Springfield, Va. 22151 AD-757 395, Price $3.00 printed copy; $1.45 microfiche. Miscellaneous Paper S-72-21, June 1972. 110 p, 49 plate, 11 tab, 13 ref.

Descriptors: *Water wells, *Well data, *Water quality, *Levees, *Mississippi River, *Illinois, Pumping, Water yield, Investigations, Methodology, Borehole cameras, Water analysis, Chemical analysis, Hydrologic data, Evaluation.
Identifiers: *Well deterioration, Relief wells.

Pumping tests, chemical and biological analyses of water samples, and well screen inspection by means of a borehole TV camera were conducted in 1969 as part of a study of the efficiency of the relief well system along the Mississippi River between Alton and Gale, Illinois. The purposes are to determine the extent and causes of well deterioration and to investigate methods for improving and maintaining the efficiency of the well system. The relief wells were designed by personnel of the U.S. Army Engineer Waterways Experiment Sta-

tion and built under the supervision of the U.S. Army Engineer District, St. Louis (SLD). The wells were installed between 1953 and 1955. Since then, SLD has performed a series of well pumping tests, periodically inspected the relief well system, and observed the operation of the wells during high river stages of the Mississippi River. Pumping tests indicated that the efficiency of the wells was decreasing at a rapid rate. Results of the 1969 pumping tests indicated that the average corrected specific yields for 24 test/wells had decreased 33% since installation. All but one of the test wells had experienced reduction in specific yield. The largest reduction amounted to 56% of the initial specific yield. The rate of sand infiltration during pumping of four wells and the amount of sediment in each test well before and after pumping indicated that the wells were stable with respect to infiltration of the aquifer sands through the filter and well screen. Chemical and biological analyses on well water samples indicated high carbonate hardness and dissolved iron and the presence of iron- and sulfate-producing bacteria. (Woodard-USGS)
W74-01942

THEORETICAL ANALYSIS OF FORCED CONVECTIVE HEAT TRANSFER IN REGIONAL GROUND-WATER FLOW,
Illinois Univ., Urbana. Dept. of Geology.
For primary bibliographic entry see Field 02F.
W74-01957

GEOLOGIC FACTORS AFFECTING COMPACTION OF DEPOSITS IN A LAND-SUBSIDENCE AREA,
Arizona Univ., Tucson. Dept. of Geosciences.
W. B. Bull.
Geological Society of America Bulletin, Vol 84, No 12, p 3783-3802, December 1973. 16 fig, 2 tab, 14 ref.

Descriptors: *Land subsidence, *Withdrawal, *Compaction, *California, Water levels, Drawdown, Clays, Irrigation water, Water wells.
Identifiers: *San Joaquin Valley (Calif).

In the west-central San Joaquin Valley, California, pumping of groundwater has changed water levels, thereby increasing the stresses that tend to compact alluvium by as much as 50% and creating a large area of intense land subsidence. The estimated (1943-1960) specific unit compaction of the deposits in a northern subarea is four times that of a southern subarea, which suggests marked differences in the compressibility of the deposits. Two-thirds of the compressibility difference is only apparent and is attributed to different water-expulsion rates in the clayey beds of different depositional environments. In the northern subarea, the deposits are mainly flood-plain sediments that contain extensive sand beds and thin clayey beds that are dewatered relatively quickly under increasing effective stress. In the southern subarea, the sediments are mainly alluvial-fan deposits that contain thick clayey sequences adjacent to lensing sandy beds. These deposits are dewatered more slowly than those in the northern subarea. (Knapp-USGS)
W74-01958

FRESH GROUNDWATER YIELD IN THE USSR AND PROSPECTS FOR ITS USE (OB EKSPLUATATSIONNYKH RESURSAKH PRESNYKH PODZEMNYKH VOD SSSR I PERSPEKTIVAKH IKH ISPOL'ZOVANIYA),
N. N. Bindeman.
Vodnyye Resursy, No 3, p 112-124, 1972.

Descriptors: *Groundwater, *Freshwater, *Water yield, *Water utilization, Groundwater resources, Groundwater basins, Artesian aquifers, Water wells, Water supply, Water storage, Water demand, Potable water, Irrigation.
Identifiers: *USSR.

Groundwater yield in the USSR as a whole considerably exceeds the country's demand for potable water. Excluding sparsely settled regions of Siberia and the Soviet Far East, the yield of fresh and slightly brackish groundwater for about one-half of the USSR is estimated at 6,000 to 7,000 cu m/sec or about 2,500-3,000 liters/day per capita. The supply of groundwater is greatest in intermontane artesian basins and piedmont diluvial deposits, where groundwater yield reaches 5-10 liters/sec/ sq km or more Ararat Valley, Chu and Issyk-Kul' basins, Kuba-Khachmas Depression, the intermontane depressions of northern and southern Tien Shan, and the Fergana Valley). Groundwater yield varies between 1 and 3 liters/sec/sq km in large artesian basins of the platform type (Moscow, Baltic, Polish-Lithuanian, and Dnieper-Donets artesian basins of European Russia). groundwater yield is 0.5-1.0 liter/sec/sq km or less in artesian basins of the southern Ukraine and is 0.1-0.5 liter/sec/sq km for the Ukrainian crystalline massif, the Stavropol' plateau, and Permian deposits on the eastern Russian Plain. Groundwater yield of less than 0.1 liter/sec/sq km is confined to the Donets Ridge, the Kalmyk Steppe, West Kazakhstan and adjoining regions of the Southern Urals and West Siberia, Central Kazakhstan, and a number of other regions in arid and semiarid zones. Basic directions and trends in the use of groundwater for water supply and irrigation are discussed, and measures are outlined for further satisfying the potable-water demands of the country. (Josefson-USGS)
W74-01965

USE AND CONSERVATION OF WATER RESOURCES IN LITHUANIA (ISPOL'ZOVANIYE I OKHRANA VODNYKH RESURSOV LITOVSKOY SSR),
R. I. Darshkus.
Vodnyye Resursy, No 3, p 18-24, 1972. 2 fig, 6 ref.

Descriptors: *Water resources, *Water utilization, *Water conservation, *Administration, Water allocation (Policy), Water control, Water requirements, Water supply, Inspection, Maps.
Identifiers: *USSR (Lithuania).

In Lithuania there are about 30,000 large and small rivers with a total length of 63,700 km. Ninety-seven percent of these rivers are small streams not exceeding 10 km in length. The number of longer rivers is 758. The number of lakes having an area greater than 0.5 ha is 2,834. Their total area is 87,702 ha or about 1.35% of the country's land area. As of January 1,1972, bathymetric maps have been constructed for 700 lakes with a total area of 72,900 ha (83%). Surface runoff in average water years is 26 cu km, and, in low-water years of 95% probability, drops to 18 cu km. Average annual streamflow varies between 5 and 13 liters/sec/sq km and averages about 7.5 liters/sec/sq km. There are 91 gaging stations in the Republic, of which one, located on the Neman River at Smalininkai, has been in operation since 1811. Groundwater yield is about 3.2 million cu m/day and satisfied potable-water requirements of the Republic. Lithuania is one of the few areas where potable-water supply is based on subsurface water sources. The importance of developing schemes for the comples use and conservation of water resources in river basins is noted, and the present system of supervision over utilization and conservation of water in the Republic and public participation in water conservation affairs are discussed. (Josefson-USGS)
W74-01970

SUBSURFACE QUALITY TRANSFORMATIONS DURING THE INITIATION OF A NEW STABILIZATION LAGOON,
Arizona Univ., Tucson. Water Resources Research Center.
For primary bibliographic entry see Field 05D.
W74-01972

GROUND DISPOSAL OF REACTOR COOLANT EFFLUENT,
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 05B.
W74-02013

WASTEWATER TREATMENT AND REUSE BY LAND APPLICATION - VOLUME I - SUMMARY,
Metcalf and Eddy, Inc., Palo Alto, Calif.
For primary bibliographic entry see Field 05D.
W74-02043

WASTEWATER TREATMENT AND REUSE BY LAND APPLICATION - VOLUME II,
Metcalf and Eddy, Inc., Palo Alto, Calif.
For primary bibliographic entry see Field 05D.
W74-02044

GROUND-WATER RESOURCES OF KLEBERG, KENEDY, AND SOUTHERN JIM WELLS COUNTIES, TEXAS,
Geological Survey, Austin, Tex.
G. H. Shafer, and E. T. Baker, Jr.
Texas Water Development Board Report 173, July 1973. 162 p, 21 fig, 10 tab, 44 ref.

Descriptors: *Groundwater resources, *Water wells, *Aquifer characteristics, *Hydrogeology, *Texas, Water utilization, Well data, Water yield, Pumping, Water level fluctuations, Water quality, Chemical analysis, Groundwater movement, Drillers logs, Basic data collections.
Identifiers: Kleberg County (Tex), Kenedy County (Tex), Southern Jim Wells County (Tex).

Kleberg, Kenedy, and southern Jim Wells Counties in south Texas on the West Gulf Coastal Plain cover an area of about 2,540 square miles. The entire area is dependent upon its groundwater resources. The Goliad Sand, which is tapped by wells throughout the report area, is the principal aquifer. The water is under artesian pressure and is yielded to flowing and nonflowing wells. The Goliad supplies all the groundwater for public supplies and irrigation, about 98% of the water used by industry, and about 95% of the water for rural-domestic and livestock needs. During 1968, about 18,000 acre-feet of groundwater was withdrawn for all purposes. Water levels in wells in the Goliad Sand declined significantly from 1932-33 to 1968-69. The quality of water from these wells deteriorates at depths greater than 1,000 feet, and the salinity of the water increases eastward. The area most favorable for the development of additional groundwater supplies from the Goliad Sand is in west-central Kenedy County, where the sands are thichest and where the present rate of development is relatively small. (Woodard-USGS)
W74-02138

GROUNDWATER RESOURCES OF BLANCO COUNTY, TEXAS,
Geological Survey, Austin, Tex.
C. R. Follett.
Texas Water Development Board Report 174, August 1973. 95 p, 13 fig, 11 tab, 34 ref.

Descriptors: *Groundwater resources, *Water wells, *Aquifer characteristics, *Water utilization, *Texas, Water quality, Water yield, Well data, Water levels, Drillers logs, Water analysis, Chemical Analysis, Basic data collections, Hydrogeology.
Identifiers: *Blanco County (Tex).

The geologic and hydrologic units in Blanco County, Texas, that yield water to wells, or are capable of yielding water, range in age from Precambrian to Quaternary. Groundwater is used primarily for rural-domestic and stock needs, and to a lesser extent for municipal supply and irrigation. Use of groundwater for all purposes in 1968 was about

1,400 acre-feet or 1.2 mgd. Of this amount, about 1,300 acretfeet was used for rural-domestic and stock needs. Only 15 acre-feet of groundwater was used for public supply. The yields of wells range from less than 1 to about 600 gpm. The potential yield of wells drilled in most places in the county is from 10 to 25 gpm. Groundwater of good to fair quality for public and domestic supplies is available in most of the county, and much of the water meets the standards recommended by the U.S. Public Health Service. Hardness is the most objectionable property. (Woodard-USGS)
W74-02141

NITROGEN TRANSFORMATIONS DURING SUBSURFACE DISPOSAL OF SEPTIC TANK EFFLUENT IN SANDS: II. GROUND WATER QUALITY,
Wisconsin Univ., Madison. Dept. of Soil Science.
For primary bibliographic entry see Field 05B.
W74-02148

4C. Effects on Water of Man's Non-Water Activities

EFFECT ON STREAMFLOW OF FOREST CUTTING AND CHANGE IN REGROWTH ON CUT-OVER AREA, (IN JAPANESE),
Government Forest Experiment Station, Tokyo (Japan).
H. Nakano.
Bull Gov For Exp Stn (Tokyo). 240 p,1-251. 1971, Illus, (English summary).
Identifiers: Cutover areas, *Forest cutting, Growth, Streamflow, Regrowth, *Clear cutting, *Japan.

To clarify the effects on streamflow of clear cutting, selection cutting, and change in regrowth and terracing on the cut-over area, some analyzes were made for the hydrological data obtained from 4 Experimental Sites, Government Forest Experiment Station, Japan, and from Wagon Wheel Gap Experimental Forest, Colorado, USA. The results were compared, among each of these major areas, as well as with other areas for which data were available.--Copyright 1973, Biological Abstracts, Inc.
W74-01782

ENVIRONMENTAL SURVEY OF THE TETON RIVER AND HENRY'S FORK OF THE SNAKE RIVER,
Idaho Univ., Moscow. Water Resources Research Inst.
For primary bibliographic entry see Field 04A.
W74-01839

URBAN GROWTH AND THE WATER REGIMEN. HYDROLOGIC EFFECTS OF URBAN GROWTH,
Geological Survey, Washington, D.C.
J. Savini, and J. C. Kammerer.
Water-Supply Paper 1591-A. 1961. 42 p, 6 fig, 2 tab.

Descriptors: *Water supply, *Water demand, Water resources, *Urbanization, *Hydrologic aspects, Water quality, Environmental effects, Pollution, Drainage, Storm runoff.

The hydrologic impact of urbanization, which includes the effects of increased population density and the concentration of residential, industrial, and commercial buildings and facilities with the resultant increase of impervious areas, consists of the influence of these changes on the natural drainage runoff, ground water, sediment, water quality and demands, and measures for disposal of wastes and surplus waters. Urbanization raises a two-sided problem, namely, an increased demand for water for municipal, industrial, and recreational purposes and a decrease in locally generated ground-water supply because of increased impervious surfaces. The disposal of domestic sewage and industrial water without contamination of natural water courses of aquifers is an additional problem. The stages of urbanization and their effects on hydrology are outlined, prior to presenting a classification of hydrologic effects, consisting of (1) the sequence of usual occurrence, (2) changes separately associated with man's use of water and man's use of the land, (3) type of hydrologic process affected, or (4) changes affecting the quantity and quality of water. The effects on the quantity of water supply are discussed, in terms of trends in water use; per capita use of water; urban demand versus supply; change from agricultural to urban use; evaporation, transpiration and infiltration; ground-water levels and pressures; artificial ground-water recharge; and use of waste water. The effects on quality of water supply in terms of disposal of wastes; effects of wastes on aquatic life; and contamination of aquifers are discussed. Drainage and storm runoff problems are discussed. An evaluation is made of the relative significance of the various effects due to urbanization. (Edwards-North Carolina)
W74-01847

NATURAL CONCERN: AN ECOLOGICAL ANALYSIS OF BIBB COUNTY.
Macon-Bibb County Planning and Zoning Commission, Macon, Ga.
For primary bibliographic entry see Field 06G.
W74-01848

4D. Watershed Protection

ESTIMATING THE LAND SLOPE OF MOUNTAIN WATERSHEDS,
Forest Service (USDA), Moscow, Idaho. Forestry Sciences Lab.
For primary bibliographic entry see Field 02A.
W74-01715

A COMPREHENSIVE PLAN FOR THE FOX RIVER WATERSHED: VOLUME ONE: INVENTORY FINDINGS AND FORECASTS.
Southeastern Wisconsin Regional Planning Commission, Waukesha.

Planning Report No. 12, April, 1969. 445 p, 100 fig, 53 maps, 95 tab, 14 append.

Descriptors: *Watershed management, *Wisconsin, *Natural resources, *Urbanization, *Flood damage, Planning, Hydrology, Land use, Water quality, Recreation, Water demand, Water law, Recreation demand, *Comprehensive planning.
Identifiers: Land use planning, *Fox River watershed (Wis), Environmental corridors.

The natural resource supply and the urbanization demand characteristics of the Fox River watershed are analyzed in great detail. The watershed is located in the rapidly urbanizing and highly recreation-oriented southeastern corner of Wisconsin. Focus is on water resources, however, the study is part of an overall planning program which includes land use, transporation, and utility plans. The first volume of the study consists of (1) statements of planning principles and concepts; (2) urban characteristics of the watershed, e.g. population, economy, and land use, and the projected growth in these variables; (3) natural characteristics including soils, vegetation, geology, climate, water resources, and wildlife; (4) the hydrology, flood characteristics, and simulated flows of the streams under varying conditions; (5) the quality of the surface water and groundwater; (6) urban water use demands; (7) recreation demands and recreation-related resource problems in the lakes, wetlands, woodlands, etc.; and (8) the nature of water law in Wisconsin. (See also W74-01857) (Elfers-North Carolina)
W74-01856

A COMPREHENSIVE PLAN FOR THE FOX RIVER WATERSHED: VOLUME TWO: ALTERNATIVE PLANS AND RECOMMENDED PLAN.
Southeastern Wisconsin Regional Planning Commission, Waukesha.

Planning Report No. 12, February, 1970. 497 p, 40 fig, 18 maps, 71 tab, 7 append.

Descriptors: *Wisconsin, *Watershed management, *Land use, Planning, Water resources development, Flood control, Water quality control, Project planning, Institutions, Non-structural alternatives, Water pollution control, *Comprehensive planning.
Identifiers: *Watershed development plans, *Fox River watershed (Wis), Land use planning, Environmental corridors.

Alternative watershed plans and programs are posited and analyzed for the Fox River watershed and a synthesis of the best elements of these is ultimately recommended to be implemented. The plan elements and analyses are based upon the detailed data collected for the urbanizing watershed in volume one of the report. This second volume emphasizes the strong relationships between land use and water resource development. The report includes sections on land use and open space plan elements, e.g. environmental corridors in marshes, wetlands, and woodlands; alternative flood control, water pollution control, and water supply plan elements; the probable land use patterns and implications in the absence of planning and land use controls; and the recommended plan including both structural and non-structural elements. A key section is on plan implementation which outlines the relevant agencies and their powers and discusses various tools such as zoning ordinances, land acquisition, tax policies, soil and water conservation practices, advanced treatment plants, and flood control structures. (See also W74-01856) (Elfers-North Carolina)
W74-01857

ANNUAL COMPILATION AND ANALYSIS OF HYDROLOGIC DATA FOR NORTH CREEK, TRINITY RIVER BASIN, TEXAS, 1971,
Geological Survey, Austin, Tex.
E. D. Lucero.
Open-file report (Texas District), August 1973. 23 p, 2 fig, 2 tab.

Descriptors: *Hydrologic data, *Small watersheds, *Erosion control, *Texas, *Rainfall-runoff relationships, Storms, Flood control, Engineering structures, Flood protection, Data collections, Soil conservation, Rain gages, Gaging stations.
Identifiers: *Trinity River basin (Tex), North Creek.

The U.S. Soil Conservation Service is actively engaged in the installation of flood- and soil-erosion reducing measures in Texas. As part of this project, hydrologic investigations of small watersheds were begun by the Geological Survey in 1951 and are now being made in 12 areas. This report contains the rainfall and runoff data collected during the 1971 water year for the 21.6-square-mile area above the stream-gaging station North Creek near Jacksboro, Texas. The locations of floodwater-retarding structures (built and proposed) and hydrologic-instrument installations are shown. The average rainfall in the study area during the 1971 water year was 24.74 inches, which is considerably less than the 14-year average of 30.13 inches for the period 1958-70. Monthly rainfall totals ranged from 0.19 inch in January to 5.77

inches in September. The yearly mean discharge was 0.79 cfs compared with the 14-year (1956-70) average of 5.75 cfs prior to the construction of the floodwater-retarding structures. The annual runoff at the stream-gaging station was 571 acre-feet, or 0.50 inch. Only the storm of September 22-23, 1971, qualified for detailed computation in the 1971 water year. Occurrence of rainfall and discharge was computed on basis of a refined time breakdown. Pattern of the storm is illustrated by hydrograph and mass curves. (Woodard-USGS)
W74-01884

ANNUAL COMPILATION AND ANALYSIS OF HYDROLOGIC DATA FOR PIN OAK CREEK, TRINITY RIVER BASIN, TEXAS, 1971,
Geological Survey, Austin, Tex.
B. B. Hampton.
Open-File report (Texas District), September 1973. 18 p, 2 fig, 2 tab.

Descriptors: *Hydrologic data, *Small watersheds, *Erosion control, *Texas, *Rainfall-runoff relationships, Storms, Flood control, Soil conservation, Data collections, Flood protection, Engineering structures, Rain gages, Gaging stations.
Identifiers: *Trinity River basin (Tex), Pin Oak Creek.

The U.S. Soil Conservation Service is actively engaged in the installation of flood- and soil-erosion reducing measures in Texas. As part of this project, hydrologic investigations of small watershed study areas were begun by the U.S. Geological Survey in 1951 and are now being made in 12 areas. Average r all over the Pin Oak Creek study area for the 1971 water year was 19.78 inches, or 53% of the long-term normal (1931-60) rainfall of 37.06 inches. Rainfall was scattered throughout the year with every month receiving some rainfall. The yearly mean discharge at the stream-gaging station Pin Oak Creek near Hubbard was 0.27 cfs, compared with the 15-year (1957-71) average of 10.9 cfs. The annual runoff was 193 acre-feet, or 0.21 inches, which represents 1% of the total rainfall. Six floodwater-retarding structures in the study area have a combined total capacity of 3,480 acre-feet at the emergency spillway crests and partly control runoff from 9.68 square miles of the 17.6-square-mile area above the stream-gaging station. Pertinent information relating to each structure is given. No storm periods were selected for detailed computations and analyses. Below-normal rainfall for the year did non produce any significant runoff events. (Woodward-USGS)
W74-01889

SEVENTEEN-YEAR SEDIMENT PRODUCTION FROM A SEMIARID WATERSHED IN THE SOUTHWEST,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
E. F. Aldon, and G. Garcia.
Research Note RM-248, September 1973. 4 p, 1 fig, 1 tab, 9 ref.

Descriptors: *Sedimentation, *Sediment transport, *Watersheds (Basins), *New Mexico, *Sediment yield, Environmental effects, Plant growth, Litter, Correlation analysis, Alluvial fans, Semiarid climates, Erosion control, Sediment control, Sedimentation rates.
Identifiers: *Rio Puerco drainage (N Mex).

Average annual rate of sediment production declined 71 percent in the period 1967-71 compared with the period 1956-66 on a 471-acre watershed on the Rio Puerco drainage in New Mexico. Sediment declined as a result of increased plant size and litter production on the alluvial flood plain above the reservoir. As sediment-laden flash floodwaters hit the alluvial fan, they were slowed down by plants and litter long enough to allow sediment to settle out above the reservoir. Perennial grass production has steadily increased from 73 pounds per acre in 1956 to a high of 721 pounds in 1969. (Woodard-USGS)
W74-01948

ANNUAL COMPILATION AND ANALYSIS OF HYDROLOGIC DATA FOR LITTLE POND CREEK AND NORTH ELM CREEK, BRAZOS RIVER BASIN, TEXAS, 1971,
Geological Survey, Austin, Tex.
J. K. VanZandt.
Open-file report (Texas District), June 1973. 52 p, 2 fig, 2 tab.

Descriptors: *Hydrologic data, *Small watersheds, *Texas, *Erosion control, *Rainfall-runoff relationships, Storms, Data collections, Hydrographs, Mass curves, Flood control, Soil conservation, Rain gages, Gaging stations.
Identifiers: *Brazos River basin (Tex.), Little Pond Creek, North Elm Creek.

The Soil Conservation Service is actively engaged in the installation of flood- and soil-erosion reducing measures in Texas. As part of this project, hydrologic investigations of small watersheds were begun by the Geological Survey in 1951 and are now being made in 12 areas. The average rainfall during the 1971 water year on the Little Pond Creek study area was 23.31 inches, or approximately 31% below the average annual rainfall of 33.85 inches at Cameron (1931-60). The average rainfall on the North Elm Creek study area was 22.10 inches, or approximately 38% below the average annual rainfall of 33.85 inches at Cameron. For the 1971 water year four storms were selected for detailed computations. These computations include detailed time breakdown of rainfall and discharge. Hydrograph and mass curves are drawn for illustrations. The storms selected occurred on October 22-23, 1970, May 8-9, 10-11, and 27-28, 1971. A summary of rainfall-runoff data for these storms is shown. (Woodard-USGS)
W74-01950

ANNUAL COMPILATION AND ANALYSIS OF HYDROLOGIC DATA FOR HONEY CREEK, TRINITY RIVER BASIN, TEXAS, 1971,
Geological Survey, Austin, Tex.
B. B. Hampton.
Open-file report (Texas District), August 1973. 28 p, 2 fig, 2 tab.

Descriptors: *Hydrologic data, *Small watersheds, *Erosion control, *Texas, *Rainfall-runoff relationships, Storms, Flood control, Flood protection, Engineering structures, Soil conservation, Data collections, Rain gages, Gaging stations.
Identifiers: *Trinity River basin (Tex), Honey Creek.

The Soil Conservation Service is actively engaged in the installation of flood and soil-erosion reducing measures in Texas. As part of this project, hydrologic investigations of small watershed study areas were begun by the U.S. Geological Survey in 1951 and are now being made in 12 areas. There are 13 floodwater-retarding structures located in the Honey Creek watershed. These structures provide capacity for flood-detention storage of 6,930 acre-feet of flood runoff from 24.6 square miles of the 39.0-square-mile drainage area. The rainfall in the study area for the 1971 water year was 22.35 inches, or 65% of the 18-year (1954-71) average of 34.27 inches. The monthly rainfall totals ranged from 0.27 inch in March to 3.83 inches in July. The yearly mean discharge at the stream-gaging station Honey Creek near McKinney was 1.05 cfs, compared with the 20-year average of 18.3 cfs. No storm periods for the 1971 water year were selected for detailed computations. (Woodard-USGS)
W74-01951

ANNUAL COMPILATION AND ANALYSIS OF HYDROLOGIC DATA FOR COW BAYOU, BRAZOS RIVER BASIN, TEXAS, 1971,
Geological Survey, Austin, Tex.
J. A. Watson.
Open-file report (Texas District), August 1973. 63 p, 3 fig, 3 tab.

Descriptors: *Hydrologic data, *Small watersheds, *Erosion control, *Texas, Basic data collections, Rainfall-runoff relationships, Streamflow, Flow rates, Gaging stations, Rain gages, Storms, Flood protection.
Identifiers: *Brazos River basin (Tex.), Cow Bayou (Tex.), Mooreville (Tex.).

The U.S. Soil Conservation Service is actively engaged in the installation of flood- and soil-erosion reducing measures in Texas. Hydrologic investigations of small watersheds were begun by the U.S. Geological Survey in 1951 and are now being made in 12 areas. This report, which is the 12th in a series of basic-data reports published annually for the Cow Bayou study area, contains the rainfall, runoff, and storage data collected during the 1971 water year for the 85.0-square-mile area above the stream-gaging station Cow Bayou at Mooreville, Texas. The location of floodwater-retarding structures and hydrologic-instrument installations in the area are shown. There are 26 floodwater-retarding structures in the study area with a combined capacity of 15,510 acre-feet below flood-spillway crests which regulate floodflows from an area of 42.7 square miles, or approximately 50% of the drainage area. The weighted-mean rainfall over the study area during the 1971 water year was 27.64 inches, or 84% of the 13-year (1959-71) average of 32.91 inches. Yearly mean discharge at the stream-gaging station was 12.5 cfs, compared with the 13-year average of 36.3 cfs. Annual runoff was 9,030 acre-feet, or 2.00 inches. A summary of rainfall-runoff data for storms on July 25, 29, and 29-30, 1971, is included. (Woodard-USGS)
W74-02137

ANNUAL COMPILATION AND ANALYSIS OF HYDROLOGIC DATA FOR MUKEWATER CREEK, COLORADO RIVER BASIN TEXAS, 1971,
Geological Survey, Austin, Tes.
J. N. Lee.
Open-file report (Texas District), 1973. 89 p, 2 fig, 3 tab.

Descriptors: *Hydrologic data, *Small watersheds, *Erosion control, *Texas, *Rainfall-runoff relationships, Storms, Flood control, Flood protection, Engineering structures, Soil conservation, Data collections, Rain gages, Gaging stations, Hydrographs, Mass curves.
Identifiers: *Colorado River basin (Tex.), Mukewater Creek.

The U.S. Soil Conservation Service is actively engaged in the installation of flood- and soil-erosion reducing measures in Texas. As part of this project, hydrologic investigations of small watersheds were begun by the Geological Survey in 1951 and are now being made in 12 areas. The six floodwater-retarding structures in the Mukewater Creek watershed have a combined total capacity of 6,000 acre-feet and control an area of 27.6 square miles, or 39% of the drainage area. The weighted-mean rainfall over the Mukewater Creek study area for the 1971 water year was 24.93 inches, approximately equal to the 18-year (1954-71) average of 24.64 inches. Monthly rainfall ranged from zero in November, January, and March to 7.62 inches in August. Yearly mean discharge at the stream-gaging station was 10.4 cfs, compared with the 20-year (1952-71) average of 10.8 cfs. Annual runoff at the stream-gaging station was 7,520 acre-feet, or 2.01 inch. Thus, only 8.1% of the rain falling on the watershed went past the gaging station at Trickham. For the 1971 water year, three storms occurred on August 1-2, 13, and September 22-24 and were selected for computa-

tion at each recording site. These computations include detailed time breakdown of rainfall and discharge. Hydrographs and mass curves are drawn for illustrations. A summary of rainfall-runoff data for the storms is shown. (Woodard-USGS)
W74-02140

05. WATER QUALITY MANAGEMENT AND PROTECTION

5A. Identification of Pollutants

HIGH SENSITIVITY LASER ABSORPTION SPECTROSCOPY OF LABORATORY AQUEOUS SOLUTIONS AND OF NATURAL MISSOURI WATERS. A FEASIBILITY STUDY,
Missouri Univ., Kansas City. Dept. of Physics.
For primary bibliographic entry see Field 02K.
W74-01658

INFRARED REFLECTANCE MEASUREMENTS OF MISSOURI WATERS FOR WATER QUALITY APPLICATIONS,
Missouri Univ., Kansas City. Dept. of Physics.
C. Waring, M. R. Querry, W. E. Holland, M. D. Hermann, and L. M. Earls.
Available from the National Technical Information Service as PB-225 420/9, $3.75 in paper copy, $1.45 in microfiche. Missouri Water Resources Research Center, Columbia, Completion Report, August 1973. 80 p, 12 fig, 13 ref, append. OWRR A-063-MO (1). 14-31-0001-3825.

Descriptors: *Infrared radiation, *Spectroscopy, *Missouri, *Acid mine water, Measurement, Soil analysis, Nitrates, Mine drainage, Refraction, *Reflectance, *Pollutant identification, Water quantity.

The relative specular reflectance of laboratory solutions of 3.0 M Sulfuric Acid and 0.5 M Sodium Nitrate was measured in the 2.0 - 20-micrometer wavelength region of the infrared. The relative specular reflectance of natural samples of (1) acid mine drainage taken from a ditch leading from the Peabody Mark Twain Mine to Hinkson Creek; (2) surface water runoff from an agricultural plot which had received a 314 lb/acre application of nitrate fertilizer; and (3) an oil sample from the Mexico, Missouri oil release into the Salt River was measured in the same spectral region. The data were collected using a Perkin Elmer E-14 spectrophotometer and a reflectometer consisting of a Cassegrain unit which collimated the radiant flux to about 18 mrad divergence, a sample holder and a Cassegrain condenser for focusing the radiant flux, reflected by the sample, onto the entrance slit of the monochromator. The angle of incidence was 70 deg. The index of refraction, extinction coefficient and phase difference spectrum throughout the 2-20-micrometer wavelength region was determined for the mine drainage, fuel oil, sulfuric acid, sodium nitrate and nitrate runoff samples using the relative reflectance measurements, the optical constants of distilled water and an algorithm for Kramers-Kronig analysis. The absolute eflectance spectrum of the alluvium and loess was determined using the relative reflectance measurements, the optical constants of distilled water and the Cauchy equation for reflectance.
W74-01659

SYMPOSIUM ON SIGNIFICANT RESULTS OBTAINED FROM THE EARTH RESOURCES TECHNOLOGY SATELLITE-1, VOL I--TECHNICAL PRESENTATIONS.
For primary bibliographic entry see Field 07B.
W74-01663

SUMMARY GROUND-WATER RESOURCES OF CLARION COUNTY, PENNSYLVANIA,
Geological Survey, Harrisburg, Pa. Water Resources Div.
For primary bibliographic entry see Field 04B.
W74-01721

ACIDIFICATION AND BUBBLING AS AN ALTERNATIVE TO FILTRATION IN DETERMINING PHYTOPLANKTON PRODUCTION BY THE 14C METHOD,
Fisheries Research Board of Canada, Winnipeg (Manitoba). Freshwater Inst.
D. W. Schindler, R. V. Schmidt, and R. A. Reid.
J Fish Res Board Can, Vol 29, No 11, p 1627-1631, 1972, Illus.
Identifiers: *Acidification, *Bubbling, *Carbon-14 method, Filtration, *Phytoplankton production.

Acidification and bubbling is superior to membrane-filtration for post-incubation treatment of 14C-productivity samples. The method eliminates errors associated with filtration. Results are compared with those of conventional and corrected filtration procedures, and application of the method is discussed.--Copyright 1973, Biological Abstracts, Inc.
W74-01749

A SIMPLE, PRACTICAL AND EFFECTIVE METHOD FOR THE ISOLATION OF SALMONELLA FROM SURFACE WATER,
Brussels.
E. Van Goethem, E. Van Oye, and L. Maes.
Zentralbl Bakteriol Parasitekd Infektionskr Hyg Reste Abt Orig Reihe A Med Microbiol Parasitol. Vol 221, No 2, p 280-282, 1972. (English summary).
Identifiers: *Isolation, *Salmonella, Surface waters, Water pollution, Filtration.

The search for Salmonella in surface waters is considerably facilitated by preliminary filtration through paper. The chances of isolation are particularly improved by increasing the number of media. This test is done to determine the extent of water pollution by the organism.--Copyright 1973, Biological Abstracts, Inc.
W74-01768

ESTIMATION OF THE BACKGROUND CONTAMINATION OF THE ATMOSPHERE FROM THE CHEMICAL COMPOSITION OF PRECIPITATION,
Main Geophysical Observatory, Leningrad (USSR).
E. S. Selezneva.
Tellus. Vol 24, No 2, p 122-127, 1972. Illus.
Identifiers: Atmosphere, Chemical composition, Contamination, *Precipitation (Atmospheric), *USSR.

The relationship of marine and continental constituents in precipitation is considered and the values of the background concentrations for different geographical regions are defined. On the basis of these relations, conclusions are drawn concerning the geographical variation, which depends on natural conditions and man's activity. Over the continental areas of the USSR the background level averages 30-40% of the total contamination, the local sources contribute 60-70%, of which 20-30% can be attributed to natural sources (soil dust, etc.), and the rest to contamination of anthropogenic origin, the latter even for the most remote clean regions is about 20-30%.--Copyright 1973, Biological Abstracts, Inc.
W74-01769

THE DETERMINATION OF PART-PER-BILLION LEVELS OF CITRIC AND NITRILOTRIACETIC ACIDS IN TAP WATER AND SEWAGE EFFLUENTS,
Missouri Univ., Columbia. Environmental Trace Substance Center.
W. A. Aue, C. R. Hastings, K. Gerhardt, J. O. Pierce, II, and H. H. Hill.
J Chromatogr. Vol 72, No 2, p 259-267. 1972, Illus.
Identifiers: *Gas chromatography, *Citric acid, Detergents, *Nitrilo triacetic acid, *Sewage effluents, *Potable water.

Citric and nitrilotriacetic (detergent additives) acids can be determined at the 1-10,000 ppb levels in aqueous systems ranging from tap water to sewage effluents by use of anion-exchange clean-up, derivatization with butanol-HCl and gas chromatography. A variety of metals present at legal tolerance limits do not interfere. The 2 esterified acids separate well on a special gas chromatographic phase; citric acid can also be separated from nitrilotriacetic acid by ion exchange prior to derivatization, if so desired.--Copyright 1973, Biological Abstracts, Inc.
W74-01772

THE CHEMICAL ANALYSIS OF NUTRIENTS,
Department of the Environment, Ottawa (Ontario). Inland Waters Branch.
For primary bibliographic entry see Field 05C.
W74-01802

BIOASSAY ANALYSIS OF NUTRIENT AVAILABILITY,
Wisconsin Univ., Madison. Water Resources Center.
For primary bibliographic entry see Field 05C.
W74-01803

WATER QUALITY IN THE CONSERVATION AREAS OF THE CENTRAL AND SOUTHERN FLORIDA FLOOD CONTROL DISTRICT, 1970--72,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 05B.
W74-01881

WATER RESOURCES DATA FOR TEXAS, 1971: PART 2. WATER QUALITY RECORDS.
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 07C.
W74-01885

MEASUREMENTS PROGRAM FOR OIL-SLICK CHARACTERISTICS--FINAL REPORT,
Michigan Univ., Ann Arbor. Willow Run Labs.
For primary bibliographic entry see Field 05B.
W74-01941

INVESTIGATION OF RELIEF WELLS, MISSISSIPPI RIVER LEVEES, ALTON TO GALE, ILLINOIS,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Soils and Pavements Lab.
For primary bibliographic entry see Field 04B.
W74-01942

REMOTE SENSING OF WATER POLLUTION AND PHYTOPLANKTON BY OPTICAL METHODS (DISTANTSIONNOYE OBNARUZHENIYE ZAGRYAZNENIY VODNYKH BASSEYNOV I FITOPLANKTONA OPTICHESKIMI METODAMI),
Leningrad State Univ. (USSR).
K. Ya. Kondrat'yev, A. A. Buznikov, and D. V. Pozdnyakov.
Vodnyye Resursy, No 3, p 65-75, 1972. 3 fig, 19 ref.

Descriptors: *Pollutant identification, *Water pollution sources, *Oil spills, *Phytoplankton,

*Remote sensing, Analytical techniques, Instrumentation, Optical properties, Chlorophyll, Oil-water interfaces, Surfaces, Reviews.
Identifiers: USSR.

One of the effects of the ever-increasing volume of industrial production today is the progressive contamination of water basins. The most serious sources of pollution are industrial wastes and oil spills. A study is made of the use of optical instruments to remotely sense oil films and areas of intensified phytoplankton production on water surfaces. A review of analytical techniques and instrumentation designed for these purposes is based on data of Soviet and foreign literature. Spectral characteristics of water, oil, and chlorophyll in the optical range of wavelengths are graphed, and ways are indicated for further improvement of optical methods of remote sensing and for possible expansion of the sphere of their application in the national economy. (Josefson-USGS)
W74-01966

ACHIEVEMENTS AND IMMEDIATE TASKS OF HYDROCHEMISTRY ON THE FIFTIETH ANNIVERSARY OF THE FOUNDING OF THE USSR (DOSTIZHENIYA GIDROKHIMII ZA 50 LET SUSHCHESTVOVANIYA SSSR I YEYE BLIZHAYSHIYE ZADACHI),
Akademiya Nauk SSSR, Leningrad. Institut Ozerovedeniya.
For primary bibliographic entry see Field 02K.
W74-01969

BACTERIOLOGICAL STUDIES ON GRAVEL PIT LAKES (BAKTERIOLOGISCHE UNTERSUCHUNGEN AN BAGGERSEEN),
Von K. Thurner, and M. Busse.
Archiv fur Hydrobiologie, Vol 72, No 2, p 253-262, July 1973. 5 fig, 20 ref. 23*Aquatic bacteria, *Aerobic bacteria, *Pollutant identification, *Separation techniques, Systematics, Biological communities, Speciation, Groundwater, Isolation.
Identifiers: *Gravel pits, *Biochemical tests, Pseudomonads, Achromobacteria, Coryneform bacteria.

Nine hundred ninety-eight isolates of aerobic bacteria from gravel pit lakes have been differentiated using a provisional key for the differentiation of water bacteria based on gram staining, O/F-test, cyctochrome oxidase and acid formation. The predominant groups obtained apparently are related to the coryneform bacteria, pseudomonads and achromobacteria. The differentiation does not yield taxonomically homogenous groups. In spite of the present deficiencies in the analysis of the flora composition quite different results have been obtained for two ground water lakes as compared with a more eutrophic lake. This seems to indicate that eventually a practical oecology of water bacteria is feasible. (Holoman-Battelle)
W74-01976

THE MAJOR IONS OF SOME LAKES AND OTHER WATERS IN QUEENSLAND, AUSTRALIA,
Monash Univ., Clayton (Australia). Dept. of Zoology.
For primary bibliographic entry see Field 02H.
W74-01979

MERCURY POLLUTION OF LAKE ERIE ECOSPHERE,
Pennsylvania State Univ., University Park. Dept. of Nuclear Engineering.
For primary bibliographic entry see Field 05B.
W74-01985

REPORT ON RELEASES OF RADIOACTIVITY IN EFFLUENTS AND SOLID WASTE FROM NUCLEAR POWER PLANTS FOR 1972.
Directorate of Regulatory Operations (AEC), Washington, D.C.
For primary bibliographic entry see Field 05B.
W74-02011

CESIUM DISTRIBUTION IN THE SURFACE LAYER OF THE PACIFIC OCEAN,
For primary bibliographic entry see Field 05B.
W74-02055

RADIOACTIVITY MEASUREMENTS AT TARAPUR NUCLEAR POWER STATION ENVIRONMENT,
For primary bibliographic entry see Field 05B.
W74-02056

DISTRIBUTION OF RA-226 IN SOIL AND WATER,
Bahaba Atomic Research Centre, Bombay (India). Health Physics Div.
For primary bibliographic entry see Field 05B.
W74-02057

RADIORUTHENIUM IN AQUATIC ENVIRONMENT OF TROMBAY,
Bahaba Atomic Research Centre, Bombay (India). Health Physics Div.
For primary bibliographic entry see Field 05B.
W74-02058

SLIDE GLASS METHOD FOR TESTING SLIME IN INDUSTRIAL WATER AND WASTE (IN JAPANESE),
Tokyo Univ. (Japan). Faculty of Pharmaceutical Sciences.
K. Shimizu, and S. Suzuki.
J Hyg Chem. Vol 18, No 1, p 19-22, 1972, Illus. (English summary).
Identifiers: Bacteria, *Colony count method, *Industrial wastes, *Slide glass method, Slime, Testing, Treatment facilities.

Comparison of the slide glass method with the colony count method gave the same results for bacterial growth, requirement of N, effect of bactericides and growth of bacteria in natural water. The slide glass method seemed useful requiring little effort for observing the growth of periphytic microbes in water treatment plants.--Copyright 1973, Biological Abstracts, Inc.
W74-02073

DIAGNOSTIC TECHNIQUES FOR EVALUATING IRRIGATION WATER QUALITY,
Haryana Agricultural Univ., Hissar (India). Dept. of Soils.
S. P. Dixit, R. M. Singh, and B. R. Tripathi.
Haryana Agric Univ J Res. Vol 1, No 2, p 35-40. 1971.
Identifiers: Anions, Cations, *Diagnostic techniques, Electrical conductivity, *India (Agra), Irrigation water, Regression equations, *Water quality.

About 60 water samples were analyzed for electrical conductivity (EC) and different cations and anions from different irrigation sources of Agra, India. EC was highly and positively correlated with cations and anions. Highly positive significant multiple correlations were also found with EC as 1 factor, various cations and anions as independent variables, cations and anions as 1 variable and remaining cations or anions as independent variables. Various regression equations derived can be used as a measure of different cations, anions, total soluble salts and total salts per acre foot etc.--Copyright 1973, Biological Abstracts, Inc.
W74-02083

INDEX OF DRINKING WATER POLLUTION: TOTAL COLIFORM MPN TESTS: CONFIRMED TEST VERSUS COMPLETED TEST,
British Columbia Provincial Lab., Vancouver.
E. J. Bowmer, and J. A. K. Campbell.
Can J Public Health. Vol 63, No 4, p 355-358. 1972, Illus.
Identifiers: *Coliform MPN tests, *Pollution index, *Potable water, *Test comparisons.

Comparison of the results of the Confirmed and Completed Tests in the Multiple Tube Fermentation Technique revealed that it is not necessary to carry out Completed Tests on all samples of drinking water yielding positive results in the Confirmed Test. The value of the Confirmed Test in determining the sanitary quality of such water supplies was established. Of 1170 samples with positive Completed Tests, 250 gave positive results (5/5 to 1/5) after 24 hr in the Presumptive and Confirmed Tests; and only 5 gave negative results (0/5) in the Completed Test. By eliminating the Completed Test on these samples (now reported as '5/5 Confirmed Test') a 13% saving of laboratory effort can be achieved.--Copyright 1973, Biological Abstracts, Inc.
W74-02087

CONTRIBUTION TO MINERAL NUTRITION OF CATTLE FROM DRINKING WATER,
E. M. Soder, and I. A. Dyer.
Can J Anim Sci. Vol 52, No 1, p 197-198. 1972.
Identifiers: *Canada (British Columbia), *Cattle, *Mineral nutrition, Ponds, Rivers, Valleys, Water wells, *Potable water.

A survey was undertaken in 1968 in the valleys and rivers of British Columbia, Canada. A total of 46 samples of well, stream and pond drinking water were analyzed for elements using an atomic absorption spectophotometer. Ca, Mg, Na and K levels and those of the trace elements Zn, Cu, Mn, Se, Mo, Fe and Co were determined while the concentrations of P and NO3 were determined on selected samples using an ammonium metavanadate method for P and the specific ion electrode for NO3. The trace element content of water was not sufficiently high to make a significant contribution to cattle nutrition. The elements Se, Mo, Fe and Co were not detected in the samples. Assuming a daily water consumption of 25 kg, the highest contributor to daily mineral requirements was Cu at 2.5%.--Copyright 1973, Biological Abstracts, Inc.
W74-02103

WATER-QUALITY RECORDS FOR SELECTED RESERVOIRS IN TEXAS, 1970-71 WATER YEARS,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 02K.
W74-02139

5B. Sources of Pollution

WATER POLLUTION BY DAIRY FARM WASTES AS RELATED TO METHOD OF WASTE DISPOSAL,
Auburn Univ., Ala. Dept. of Animal and Dairy Science.
T. A. McCaskey, G. H. Rollins, and J. A. Little.
Available from National Technical Information Service as PB-225 470/4 $3.75 in paper copy; $1.45 in microfiche. Alabama Water Resources Research Institute Bulletin 18, 1973. 86 p, 12 fig, 24 tab, 3 append. OWRR B-017-ALA (2).

Descriptors: *Dairy industry, *Waste disposal, Soil disposal fields, Irrigation waste water, Lagoons, Runoff, Water quality, *Farm wastes, *Farm lagoons, Waste treatment.
Identifiers: *Waste disposal methods, *Field spreading, Manure loading rates, Runoff quality, Lagoon efficiency.

Three field spreading methods and a lagoon system were evaluated for the disposal of dairy-cow waste. Three rates of waste were applied to grassland plots by each of the field spreading methods for 27 months. Runoff water was collected from the plots, and also from a check plot to evaluate runoff water quality. The scrape-haul method contributed more BOD load to runoff, and more fecal coliforms and nitrate to the soil than the irrigation or tank-wagon methods. The most BOD and nitrate in runoff during 1971 for all methods of field spreading waste occurred during August during which the rainfall was lowest for the year. The least BOD and nitrate in runoff coincided with the month of most rainfall (March). At 10 to 21 tons waste applied annually on grassland there was not an appreciable deterioration of runoff water quality nor buildup of soil nitrate. A two-stage lagoon system designed for 300 cu ft storage capacity per cow in the first stage and 643 cu ft capacity in the second stage for cows using milking facilities reduced BOD, 95%, COD, 93%, Kjeldahl-nitrogen, 82%, and fecal coliforms, 99%. For herds of 120 cows in confinement the estimated annual cost per cow for manure management by the irrigation method was $30.31 and $24.07 for the scrape-haul method. The cost for systems that accommodated cows during milking was estimated at $11.24 per cow for the lagoon method and dated cows during milking was estimated at $11.24 per cow for the lagoon method and $21.21 per cow for the tank-wagon method.
W74-01651

RELATIVE LEACHING RATES OF COMMON NITROGEN CARRIERS FROM SANDY SOILS IN RELATION TO LAKE EUTROPHICATION,
Rollins Coll., Winter Park, Fla. Dept. of Biology.
D. E. Smith.
Available from the National Technical Information Service as PB-225 474/6 $3.75 in paper copy; $1.45 in microfiche. Florida Water Resources Research Center, Gainesville, Publication No. 22, July 1973 72 p, 33 fig, 6 tab, 17 ref, 2 append. OWRR A-018-FLA (1), 14-31-0001-3509 and 14-31-0001-3809.

Descriptors: Fertilizers, *Eutrophication, *Nitrogen compounds, *Leaching, Sands, Soil types, Litter, Soil columns, Nutrients, Lakes, *Florida, Path of pollutants, *Storm water, Urban runoff.
Identifiers: Lawn fertilization, *Sandy soils, Winter Park (Fla.), Street litter.

A study of three sands in sterilized columns revealed that, with the exception of nitrate, the mineral fraction of these soils is moderately resistant to leaching of several common nitrogen carriers. It is proposed that this resistance to leaching provides an effective buffer against increased nutrient loadings of ground water by heavy applications of manufactured fertilizer. A principal conclusion of the study is that accelerated lake eutrophication is taking place because surface waters are being nourished at levels above that normally provided by ground water seepage. It is believed that much of this hypernourishment is brought about by direct flushing of large amounts of material of biological origin into the lake basins by storm water.
W74-01654

THE ROLE OF MOLECULAR DIFFUSION IN DISPERSION THEORY,
Hebrew Univ., Jerusalem (Israel).
For primary bibliographic entry see Field 02E.
W74-01713

SEPTIC SYSTEMS: EFFECTS OF SURFACE AND SUBSURFACE WATER,
Lake County Health Dept., Waukegan, Ill.
L. Mellen.
Journal of Soil and Water Conservation, Vol 28, No 5, p 221-223, September - October 1973. 1 fig, 9 ref.

Descriptors: *Septic tanks, *Soil disposal fields, *Illinois, Waste water treatment, Waste disposal, Soil properties.
Identifiers: *Lake County (Ill).

In Lake County, Illinois, 80% of the soils have severe limitations for septic systems. Only 10% are ideally suited to such systems. These are deep loam and sandy loam soils. Another 10%, underlain with sand and gravel, are suitable for septic systems, but they could contribute to groundwater pollution. The 80% of the county's soils unsuitable for septic systems usually have slowly permeable subsoils or a water table within 1 to 3 feet of the soil surface. In the design of any septic system some basic rules apply. Seepage lines must follow contour lines exactly so they will not pick up groundwater. Curtain drains must be installed above the field on all soils with impervious clay subsoils to intercept the movement of groundwater. Soil placed over trenches should be similar to the original soil. All soils in which septic systems are installed must have at least 12 inches of permeable material below seepage lines. Because percolation tests vary seasonally, hydraulic conductivity of the soil should be determined. Where rainfall or septic effluent raises the water table, subsurface drainage with a suitable outlet is needed. (Knapp-USGS)
W74-01716

ORGANIC MATTER AND ELEMENTS IN THE HYDROLOGIC REGIMEN OF VOLGA RESERVOIRS (ORGANICHESKOYE VESHCHESTVO I ELEMENTY GIDROLOGICHESKOGO REZHIMA VOLZHSKIKH VODOKHRANILISHCH).
Akademiya Nauk SSSR, Moscow. Institut Biologii Vnutrennkh Vod.

Akademiya Nauk SSSR Institut Biologii Vnutrennikh Vod Trudy, No 23 (26), N. V. Butorin, editor, Leningrad, 1972. 248 p.

Descriptors: *Organic mater, *Regimen, *Hydrologic cycle, *Reservoirs, Lakes, Water levels, Runoff, Fluctuations, Cycles, Microbiology, Aquatic life, Inorganic compounds, Chemical analysis, Bottom sediments, Suspended solids, Water properties, Water pollution, Statistical methods, Correlation analysis, Seasonal.
Identifiers: *USSR (Volga River), Spectrograms.

Twenty-one papers are contained in No. 23 (26) of the Transactions of the USSR Academy of Science's Institute of Biology of Inland Waters published in 1972. Topics of individual papers include: (1) photosynthesis, destruction of ogranic matter, and dynamics of bacteria populations in the Rybinsk Reservoir in 1968; (2) microbiological characteristics of the Rybinsk Reservoir in 1969; (3) organic matter in water of the Volga River and its reservoirs in Jun 1966 and July 1969; (4) organic matter in Lake Onega and some water bodies of the Volga-Baltic Waterway in the summer of 1968; (5) concentration and distribution of nitrogen compounds in the Rybinsk Reservoir in summer and autumn; (6) elements in the balance of biogenic substances in the Kuybyshev Reservoir; (7) scientific bases for forecasting concentrations of biogenic elements and organic matter in reservoirs; (8) changes in physical and chemical characteristics of water masses of the Rybinsk Reservoir; (9) sun-induced fluctuations of Volga runoff; (10) nature of 7-year cycles in long-term fluctuations of Volga runoff; (11) 2-year cyclic fluctuations of Volga runoff; (12) some features of the hydrologic regimen of Saratov Reservoir; (13) suspended-sediment balance in the Rybinsk Reservoir, (14) suspended-sediment balance in the Uglich Reservoir; (15) sediment-retaining capacity of the Uglich Reservoir; and (16) estimates of the pollution of Ivan'kovskoye Reservoir by bituminous substances. (Josefson-USGS)
W74-01723

ORGANIC MATTER IN WATER OF THE VOLGA RIVER AND ITS RESERVOIRS IN JUNE 1966 AND JULY 1969 (ORGANICHESKOYE VESHCHESTOVO V VODE VOLGI I YEYE VODOKHRANILISHCH V IYUNE 1966 G. I IYULE 1969 G.),
Akademiya Nauk SSR, Moscow. Institut Biologii Vnutrennkh Vod.
B. A. Skopintsev, A. G. Bakulina, Ye. M. Bikbulatova, N. A. Kudryavtseva, and N. I. Mel 'nikova.
In: Organicheskoye veshchestvo i elementy gidrologicheskogo rezhima volzhskikh vodokhranilishch; Akademiya Nauk SSR Institut Biologii Vnutrennikh Vod Trudy, No 23 (26), p 39-53, Leningrad, 1972. 1 fig, 5 tab, 10 ref.

Descriptors: *Organic matter, *Rivers, *Reservoirs, Water properties, Biochemical oxygen demand, Oxygen, Dissolved oxygen, Color, Carbon, Oxidation, Water sampling, Waste water (pollution), Chemical analysis.
Identifiers: *USSR (Volga River), Organic carbon.

Permanganate oxidizability of waters of the Volga River and its reservoirs, determined in June 1966 in the navigable reach from Rybinsk Reservoir to Kuybyshev, differs little from results obtained in the spring and summer of 1954-55. The content of organic carbon in dry residues of evaporated waters in June 1966 approached oxygen values of permanganate oxidizability. The content of total organic carbon, determined for the first time in July 1969 in water samples collected in the reach from Rybinsk Reservoir to Astrakhan, varied between 7.2 and 10.3 mg/liter and was, on the average, 6% higher than the carbon content in dry residues. The 5-day BOD values in the reach varied between 0.72 and 2.3 mg/liter and averaged 1.3 mg/liter. Results of a chemical analysis of samples of waste waters collected from a number of cities and industrial enterprises on the Volga in June 1966 are tabulated. (See also W74-01723) (Josefson-USGS)
W74-01724

ORGANIC MATTER IN WATER OF LAKE ONEGA AND SOME WATER BODIES OF THE VOLGA-BALTIC WATERWAY IN THE SUMMER OF 1968 (ORGANICHESKOYE VESHCHESTVO V VODE ONEZHSKOGO OZERA I NEKOTORYKH VODOYEMOV VOLGO-BALTIYSKOGO VODNOGE PUTI LETOM 1968 G.),
Akademiya Nauk SSSR, Moscow. Institut Biologii Vnutrennkh Vod.
B. A. Skopintsev, A. G. Bakulina, and N. I. Mel 'nikova.
In: Organicheskoye veshchestvo i elementy gidrologicheskogo rezhima volzhskikh vodokhranilishch; Akademiya Nauk SSSR Institut Biologii Vnutrennikh Vod Trudy, No 23 (26), p 54-61, Leningrad, 1972. 4 tab, 19 ref.

Descriptors: *Organic matter, Bodies of water, *Lakes, *Reservoirs, *Inland waterways, Water properties, Biochemical oxygen demand, Oxygen, Color, Carbon, Oxidation, Water sampling, Summer.
Identifiers: *USSR (Lake Onega), *USSR (Volga River), *Baltic Sea, Organic carbon.

The content of organic carbon in dry residues in surface and deep waters of the open area of Lake Onega in July 1968 varied between 5.7 and 5.9 mg/liter. The ratio of oxygen of permanganate oxidizability to organic carbon was 1:1. The amount of organic matter oxidized in waters of Lake Onega after 120 days was 14%-18%, and in waters of the Rybinsk and Sheksna Reservoirs and Lakes Beloye and Siverskoye 23%-28%. (See also W74-01723) (Josefson-USGS)
W74-01725

CONTENT AND DISTRIBUTION OF NITROGEN COMPOUNDS IN THE RYBINSK RESERVOIR IN SUMMER AND AUTUMN (SODERZHANIYE I RASPREDELENIYE SOYEDINENIY AZOTA V RYBINSKOM VODOKHRANILISHCHE V LETNE-OSENNIY PERIOD),
Akademiya Nauk SSSR, Moscow. Institut Biologii Vnutrennkh Vod.
N. A. Trifonova, and L. A. Kalinina.
In: Organicheskoye veshchestvo i elementy gidrologicheskogo rezhima volzhskikh vodokhranilishch; Akademiya Nauk SSSR Institut Biologii Vnutrennikh Vod Trudy, No 23 (26), p 73-79, Leningrad, 1972. 4 fig, 2 tab, 7 ref.

Descriptors: *Nitrogen compounds, *Reservoirs, *Summer, *Autumn, Nitrogen, Carbon, Organic matter, Oxidation, Phytoplankton, Chlorophyll, Suspended solids, Color, Water analysis, Chemical analysis, Water sampling.
Identifiers: *USSR (Rybinsk Reservoir), Organic carbon.

Total nitrogen content in the Rybinsk Reservoir in the summer of 1965 varied between 1.0 and 2.4 mg/liter in natural water and between 0.85 and 1.71 mg/liter in filtered water. The amount of organic nitrogen was 98% of total nitrogen. The content of ammonium nitrogen was generally within limits of 0.10-0.15 mg/liter in surface horizons and within limits of 0.2-0.3 mg/liter in bottom waters. The content of nitrate nitrogen was generally measured in hundredths or thousandths of a milligram per liter, and only in Volga waters did it reach higher values. The content of organic matter also varied widely and was accompanied by changes in the C:N ratio ranging from 6 to 15. By October, the content of organic matter in the reservoir water had decreased somewhat but was still comparatively high. The composition of organic matter was characterized by a wider C:N ratio (8-24). The total content of nitrogen at this time dropped to 0.9 to 1.76 mg/liter, while the amount of organic nitrogen remained high (68%-91%). The concentrations of mineral forms of nitrogen were small. The amount of suspended substances increased slightly, varying between 5 and 23 mg/liter. In summer the principal factor governing the content and distribution of different forms of nitrogen in the reservoir is the photosynthetic activity of phytoplankton. The distribution of water masses and the total content of organic substances during this period have little effect on the concentration, distribution, and forms of nitrogen compounds. A slightly greater effect is observed in autumn. (See also W74-01723) (Josefson-USGS)
W74-01726

NATURE OF SEVEN-YEAR CYCLES IN LONG--TERM FLUCTUATIONS OF VOLGA RUNOFF (O PRIRODE SEMILETNEY TSIKLICHNOSTI V MNOGOLETNIKH KOLEBANIYAKH STOKA VOLGI),
Akademiya Nauk SSSR, Moscow. Institut Biologii Vnutrennykh Vod.
For primary bibliographic entry see Field 02E.
W74-01727

SOME FEATURES OF THE HYDROLOGIC REGIMEN OF SARATOV RESERVOIR (NEKOTORYYE CHERTY GIDROLOGICHESKOGO REZHIMA SARATOVSKOGO VODOKHRANILISHCHA),
Akademiya Nauk SSSR, Moscow. Institut Biologii Vnutrennykh Vod.
For primary bibliographic entry see Field 04A.
W74-01728

SUSPENDED-SEDIMENT BALANCE IN THE RYBINSK RESERVOIR (BALANS VZVESHENNYKH VESHCHESTV V RYBINSKOM VODOKHRANILISHCHE),
Akademiya Nauk SSSR, Moscow. Institut Biologii Vnutrennykh Vod.
N. A. Ziminova, and V. P. Kurdin.
In: Organicheskoye veshchestvo i elementy gidrologicheskogo rezhima volzhskikh vodokhranilishch; Akademiya Nauk SSSR Institut Biologii Vnutrennikh Vod Trudy, No 23 (26), p 199-210, Leningrad, 1972. 5 tab, 34 ref.

Descriptors: *Reservoirs, *Sedimentation, *Reservoir silting, *Suspension, *Suspended solids, Deposition (sediments), Sediment load, Sediment discharge, Sediment yield, Bottom sediments, Erosion, Peat, Organic matter, Plankton, Productivity.
Identifiers: *USSR (Rybinsk Reservoir).

The balance of sediments in suspension in reservoirs is usually compiled to estimate the silting of water bodies and the direction of this process in time. Estimates are made of items in the balance of suspended sediments in the Rybinsk Reservoir for a 25-year period (1941-65). Major incoming items are suspended-sediment loads of rivers, plankton productivity, erosion of peat, and bank and bed erosion. Outgoing items are suspended-sediment discharge through the Rybinsk works, and deposition of bottom sediments. The role of azonal factors in bottom-sediment deposition during this period is examined, and consideration is given to reworking of sediments to calculate silting of large lake-like reservoirs. On the basis of changes occurring in the sediment-suspension balance in the 1960's, the rate of sedimentation was calculated to have decreased and the role of zonal factors in this process to have increased. As a result of curtailed uptake of suspended organic matter from local sources, the percentage of allochthonous organic suspensions in the total balance increased. (See also W74-01723) (Josefson-USGS)
W74-01729

SUSPENDED-SEDIMENT BALANCE IN THE UGLICH RESERVOIR (BALANS VZVESHENNYKH VESHCHESTV V UGLICHSKOM VODOKHRANILISHCHE),
Akademiya Nauk SSSR, Moscow. Institut Biologii Vnutrennykh Vod.
N. A. Ziminova, and V. P. Kurdin.
In: Organicheskoye veshchestvo i elementy gidrologicheskogo rezhima volzhskikh vodokhranilishch; Akademiya Nauk SSSR Institut Biologii Vnutrennikh Vod Trudy, No 23 (26), p 211-220, Leningrad, 1972. 4 tab, 23 ref.

Descriptors: *Reservoirs, *Sedimentation, *Suspension, *Suspended solids, Deposition (sediments), Sediment load, Sediment discharge, Sediment yield, Bottom sediments, Band erosion, Turbidity, Waves (water), Winds, Plankton, Aquatic plants, Productivity, Hydroelectric plants.
Identifiers: *USSR (Uglich Reservoir).

The equation of the balance of sediments in suspension in the Uglich Reservoir was based on results of investigations of sediment suspension in Upper Volga reservoirs. Estimates are made of items in the balance of suspended sediments in the reservoir for a 29-year period (1940-68). Incoming items are sediment load at the gaging station of the Ivan 'kovskdya Hydroelectric Plant, sediment loads of rivers, bank erosion, and productivity of plankton and higher aquatic vegetation. Outgoing items are sediment deposition, suspended-sediment discharge through the Uglich works, and suspended-sediment concentration in the water mass at the end of the design period. Analysis of temporal changes in the relation of balance items reveals a relative increase in recent years (1962-68) in the percentage of river sediments and plankton in the incoming part of the balance and an almost twofold increase in the relative amount of suspended-sediment discharge through the Uglich works in the outgoing part. (See also W74-01723) (Josefson-USGS)
W74-01730

SEDIMENT-RETAINING CAPACITY OF THE UGLICH RESERVOIR (O NANOSOUDERZHIVAYUSHCHEY SPOSOBNOSTI UGLICHSKOGO VODOKHRANILISHCHA),
Akademiya Nauk SSSR, Moscow. Institut Biologii Vnutrennykh Vod.
For primary bibliographic entry see Field 02J.
W74-01731

TOXICITY OF POWER PLANT CHEMICALS TO AQUATIC LIFE.
Battelle-Pacific Northwest Labs., Richland Wash.
For primary bibliographic entry see Field 05C.
W74-01732

THE USE OF AQUATIC MACROINVERTEBRATES AS INDICATORS OF STREAM POLLUTION,
Western Michigan Univ., Kalamazoo. Dept. of Biology.
C. J. Goodnight.
Trans Am Microsc Soc, Vol 92, No 1, p 1-13, 1973, Illus.
Identifiers: *Aquatic organisms, *Indicators (Pollution), *Invertebrates, Pollution, Streams.

The presence of aquatic organisms often provides the best indication of the condition of a stream. Most groups of aquatic organisms have been suggested as valuable indicator species. All groups have some merit but none are adequate alone. The tendency now is to consider the entire community as a unit of study in determining the health of a stream. Several useful techniques of reporting these community analyses are discussed.--Copyright 1973, Biological Abstracts, Inc.
W74-01742

THE INFLUENCE OF A CHEMICAL PLANT SEWAGE SEDIMENTATION CATCHPIT ON GROUNDWATERS OF THE UPPER VISTULA FLOODPLAIN,
Academy of Mining and Metallurgy, Krakow (Poland). Inst. of Hydrogeology and Engineering Geology.
A. S. Kleczkowski, S. Kurdyka, and J. Stobierski.
Bull Acad Pol Sci Ser Sci Terre. Vol 20, No 1, p 55-59, 1972. Illus.
Identifiers: Chemicals, Chlorides, *Floodplains, Groundwater, *Poland (Upper Vistula), Pollution, *Sedimentation catchpits, *Sewage.

The substratum of catchpits is composed of peat, sand and imperviousslty formations. Hydrochemical observations in the vicinity of catchpits (12 square km), using 120 analyses from 44 locations (piezometers and village wells), showed zonal water-pollution by chlorides and sulfates in concordance with groundwater flow direction and lowering of the impervious substratum. The range of phenol pollution was limited to 500 in from the pollution source, which is probably connected with peat absorption. Nekal pollution was still found 3 km from its source.--Copyright 1973, Biological Abstracts, Inc.
W74-01754

PREDICTION OF COPPER TOXICITY IN RECEIVING WATERS,
Environmental Protection Service, St. John's (Newfoundland).
For primary bibliographic entry see Field 05C.
W74-01775

NOTE ON BIOASSAY TRIALS ON THE EFFECT OF RAINFALL ON ACARICIDE RESIDUES,
Central Plant Protection Training Inst., Hyderabad (India).
B. K. Varma, and R. T. Gahukar.
Indian J Agric Sci. Vol 42, No 3, p 267-269. 1972.

Identifiers: *Acaricide residues, Bioassay, Dimethoate, *India, Parathion, Phaseolus-Vulgaris, Phosphamidon, Rainfall, Tetranychus-Telarius, *Mites (Red spider), *Pesticide residues, Carbophenothion.

The effect of rain on organophosphate pesticides, applied for the control of red spider mites, Tetranychus telarius L., a pest of beans, Phaseolus vulgaris L., was studied. Dimethoate and phosphamidon showed significantly lower depletion with rainfall when compared with carbophenothion and parathion, and may be the insectidies of choice during the monsoon season in India.--Copyright 1973, Biological Abstracts, Inc.
W74-01777

LARVAL DISTRIBUTION OF PARACLUNIO ALASKENSIS AT POINT PINOS SEWAGE OUTFALL, MONTEREY COUNTY, CALIFORNIA (DIPTERA, CHIRONOMIDAE),
De Anza Coll., Cupertino, Calif. Dept. of Biology.
D. T. Cheeseman Jr., and P. Preissler.
Pan-Pac Entomol. Vol 48, No 3, p 204-207. 1972, Illus.
Identifiers: *California (Monterey County), *Chironomidae, *Diptera, Distribution (Larval), Paraclunio-Alaskensis, *Sewage outfall, Outlets, *Midges.

A population of the midge Paraclunio alaskensis was studied at Point Pinos sewage outfall in Pacific Grove, Monterey Co., California. The study was made to determine the relationship of P. alaskensis larvae to the Point Pinos sewage outfall environment. A sampling method, developed to collect P. alaskensis larvae from the organic slime where they fed, included scraping entire 20 cm X 20 cm quadrants into a special collecting tray. Analysis of the population by sampling indicates that P. alaskensis larvae were abundant close to the outfall where there were large amounts of organic slime and little competition for space. The larvae decrease in number as distance from the outfall increases. A gradual decrease in organic slime and increase in marine algae and invertebrates occurred as distance from the outfall increased. It is proposed that P. alaskensis larvae may be a macroscopic indicator for human sewage pollution at freshwater rocky outfalls in a marine ecosystem.--Copyright 1973, Biological Abstracts, Inc.
W74-01779

SEASONAL VARIATIONS IN RESIDUES OF CHLORINATED HYDROCARBON PESTICIDES IN THE WATER OF THE UTAH LAKE DRAINAGE SYSTEM: 1970 AND 1971,
Brigham Young Univ., Provo, Utah. Dept. of Chemistry.
J. S. Bradshaw, E. L. Loveridge, K. P. Rippee, J. L. Peterson, and D. A. White.
Pestic Monit J. Vol 6, No 3, p 166-170. 1972, Illus.
Identifiers: *Aldrin, *BHC, *Chlorinated hydrocarbon pesticides, DDE, Drainage, Fish, Heptachlor, Lakes, *Pesticide residues, Seasonal, *Utah Lake, Water pollution sources.

Definite surges of pesticides (1 ppb or more) enter Utah Lake, 3 times per year--early spring, late spring, and fall, generally corresponding to the application times of pesticides by farmers in the area. The pesticides involved were mainly aldrin and BHC in the early spring; heptachlor (plus heptachlor epoxide) and methoxychlor in the late spring; and aldrin, heptachlor, and methoxychlor in the late fall. The fish samples collected from Utah Lakecontained only small amounts of pesticides, the highest level being 956 ppb DDE.--Copyright 1973, Biological Abstracts, Inc.
W74-01780

ENTRY OF CHEMICAL ELEMENTS--ANALOGUES (STRONTIUM-90-CALCIUM AND CESIUM-137-POTASSIUM) INTO PLANTS IN RELATION TO SOIL MOISTURE, (IN RUSSIAN),
For primary bibliographic entry see Field 02I.
W74-01783

DISSOLVED POLLUTION PRODUCT GASES IN NATURAL WATERS,
Maine Univ., Walpole. Dept. of Oceanography.
E. J. Green.
Available from the National Technical Information Service as PB-225 543/8, $3.00 in paper copy, $1.45 in microfiche. Maine Water Resources Center, Bangor Project Completion Report, August 1973. 27 p, 5 fig, 39 ref, 1 append. OWRR A-024-ME (1).

Descriptors: *Analytical techniques, *Bays, *Gases, *Sulfides, Chemical analysis, Sediments, Solubility, Estuaries, Cores, *Maine, Sedimentation, Toxicity, Oxidation, Tides, Circulation, Hydrogen sulfide.
Identifiers: *Dissolved gases, *Potentiometric titration, *Montsweag Bay (Maine).

Concern about effects of resuspension of watery deposits by increased tidal circulation upon removal of a causeway in upper Montsweag Bay, Maine prompted development of an analytical method for dissolved sulfide which avoids some problems of other procedures and yields a measure of water-soluble as contrasted with acid-soluble sulfide. Development of the sulfide antioxidant buffer allows potentiometric titrations for dissolved sulfide to be performed providing cadmium or lead rather than silver is used as titrant. Depth distribution of water soluble sulfide was determined for eight sediment cores. Concentration profiles showed one or two distinct maxima near surface, the depth to these ranging from 30 cm in slow sedimentation areas to 120 cm in rapid sediment accumulation areas. Sulfide concentrations at the maxima range from 1. to 8. moles sulfur/cu m of in situ mud. Caution should be exercised in activities like the causeway removal as the oxygen demand of surficial sediments is significant. Conservative estimated mean of 5. mole sulfide/cu m showed a mixing ratio of less than 30 volumes of oxygen saturated sea water per volume of mud will render water toxic. (Jones-Wisconsin)
W74-01786

CHEMISTRY AND APPLICATION OF ORGANOPHOSPHORUS COMPOUNDS, PROCEEDINGS OF THIRD CONFERENCE.

Available from the National Technical Information Service, $3.00 in paper copy, $1.45 in microfiche. Trans. of Khimiya ' Primeneniye Fosfororganicheskikh Soyedinen'y, Trudy 3' yey Konf., 1972, Moscow, JPRS Trans. 57825, December 1972. 147 p, 29 fig, 31 tab, 262 ref.

Descriptors: *Pesticides, *Organophosphorus compounds, *Organophosphorus pesticides, Pesticide toxicity, Pesticide kinetics, Chemical reactions, Analytical techniques, Toxicity, Inhibition, Insecticides, Formulation, Biochemistry.
Identifiers: Metathion, Phenitrothion, Complexones.

Selected papers, translated from the Russian, cover the fields of organophosphorus compounds pertaining to their chemistry, analytical techniques, metabolism in organisms and their toxicity and mechanisms. The contributions are titled: 'Conjugation in Systems With Tetrahedral Phosphorus,' 'Application of Nuclear Magnetic Resonance in Chemistry of Organophosphorus Compounds,' 'Metabolism of Organophosphorus Compounds in Animals,' 'Derivatives of Phosphacyclopentene,' 'Organophosphorus Compounds Containing a P-N-bond,' 'Anticholinesterase Properties of Certain Organophosphorus Compounds,' 'On the Interaction Between Organophosphorus Inhibitors and Cholinesterase,' 'Certain Problems in Quantitative Toxicology of Organophosphorus Compounds,' 'Metathion--A New Lowtoxicity Organophosphorus Insecticide,' and 'Experimental Investigations of the Biological Activity of Organophosphorus Complexones.' (See W74-01788 thru W74-01797) (Auen-Wisconsin)
W74-01787

CONJUGATION IN SYSTEMS WITH TETRAHEDRAL PHOSPHORUS,
Akademiya Nauk SSSR, Moscow. Inst. of Heteroorganic Compounds.
M. I. Kabachnik.
In: Chemistry and Application of Organophosphorus Compounds Proceedings of Third Conferences Trans. from Russian; JPRS Translation 57825, December 1972. p 1-28, December 1972. 5 fig, 97 ref.

Descriptors: *Organophosphorus compounds, Organophosphorus pesticides, Chemical reactions, Chemistry, Molecular structure.

The question concerning the participation of phosphorus atoms in a conjugation chain and their capacity to transfer electron influences from one part of a molecule to another is related to a more general question concerning the participation of the d-orbit of phosphorus in the formation of chemical bonds. In conjugate systems with the tetrahedral phosphorus atom, located at the end of the chain, it may participate in the conjugation to the extent of formation of 3d-sub-pi -2p-sub-pi-bonds. The energy effect of this conjugation is minor and the structure of the compounds is closer to phosphonium or phosphoryl than to the alternative with phosphinomethylene bond, but the effect of conjugation nevertheless clearly influences the chemical and optical properties of the compounds. The importance is in the substantial difference that in purely carbon conjugate systems the displacement of charges (+T-effect) occurs within a single chromophore, and during reactions of organophosphorus conjugate systems there occurs electrometric transfer of charge from one chromophore to another. It is here, in view of participation of 3d-sub-pi-2p-sub-pi pi-bonds of phosphorus that the effect is usually minor and conjugation is weak. (See also W74-01787) (Auen-Wisconsin)
W74-01788

APPLICATION OF NUCLEAR MAGNETIC RESONANCE IN CHEMISTRY OF ORGANOPHOSPHORUS COMPOUNDS,
Akademiya Nauk SSSR, Moscow. Institut Organicheskoi Khimii; and Kazan Inst. of Chemical Technology (USSR).
Yu. Yu. Samitov, and T. V. Zykova.
In: 'Chemistry and Application of Organophosphorus Compounds,' Proceedings of Third Conference. Trans from Russian Joint Publications Research Service Report 58725, p 29-63, December 1972. 7 fig, 5 tab, 55 ref.

Descriptors: *Organophosphorus compounds, *Analytical techniques, *Chemistry, Spectroscopy, Molecular structure, Phosphorus.
Identifiers: *Nuclear magnetic resonance, Double nuclear magnetic resonance.

High-resolution nuclear magnetic resonance spectroscopy (NMR) has become one of the most important physical methods of analyzing the structure of organic compounds. The resonance of the phosphorus P-31 nucleus also contains a wealth of information about the chemical environment of phosphorus and the nature of chemical bonds between phosphorus and atoms combined with it. In analyzing the final organophosphorus compounds synthesis products organic chemists are aided by a knowledge of the physical constants, IR-spectra and NMR spectra of the proton and

chemical shifts of P-31 nuclei. Chemical shifts is one of the most important parameters of the NMR-spectrum. The application of nuclear magnetic resonance in organophosphorus chemistry is described. (See also W74-01787) (Auen-Wisconsin)
W74-01789

METABOLISM OF ORGANOPHOSPHORUS COMPOUNDS IN ANIMALS,
Leningradskii Meditsinskii Institut (I) (USSR).
V. I. Rozengart.
In: 'Chemistry and Application of Organophosphorus Compounds,' Proceedings of Third Conference. Trans. from Russian Joint Publications Research Service Report 58725, p 64-75, December 1972.

Descriptors: *Organophosphosphorus compounds, *Metabolism, *Epizootiology, Biochemistry, Toxicity, Chemical properties, Chemical reactions.
Identifiers: *Metabolic transformations, Selective toxicity, Fermentative transformation, Detoxification, Anticholine esterase activity.

Chemical conversions experienced by organophosphorus compounds (OPC) during metabolism usually determine the selective toxicity of these compounds and a thorough knowledge of OPC reactions in the body is essential for the synthesis of new compounds with predetermined properties. The present incomplete information evidences an extreme variety of OPC metabolic transformations as paths of fermentative transformation. The possibility of artificially influencing the activity of OPC-metabolizing ferments, i.e., depressing or enhanching their action is of great practical importance. Aldrine and certain chlorinated hydrocarbons activate many esterases, thereby strenghening the hydrolysis and consequently the detoxification of OPC. Extensive investigation of the activators and inhibitors of ferments that metabolize OPC may serve as the foundation for development of prophylactic methods and therapy of OPC poisoning, and also of selectively increasing toxicity for insects. The question as to what is the source of ferments in animal organisms that act on compounds that are not only completely foreign to the organism, but also are absent in nature under natural conditions is answered by a hypothesis--the reaction products are always more polar and less lipid-soluble than the original compounds--a view that illustrates why many metabolic OPC transformations lead to the formation of more toxic products. (See also W74-01787) (Auen-Wisconsin)
W74-01790

DERIVATIVES OF PHOSPHACYCLOPENTENE,
Akademiya Nauk SSR, Kazan. Inst. of Organic and Physical Chemistry.
B. A. Arbuzov, A. O. Vizel, M. A. Zvereva, K. M. Ivanovskaya, and Yu. Yu. Samitov.
In: 'Chemistry and Application of Organophosphorus Compounds' Proceedings of Third Conference. Trans. from Russian Joint Publications Research Service Report 58725, p 76-85, December 1972. 4 fig, 2 tab, 19 ref.

Descriptors: *Organophosphorus compounds, *Chemical properties, Chemical reactions, Toxicity, Lethal limit, Chemistry.
Identifiers: *Phosphacyclopentene, Phospholene, Drugs.

McCormack's discovery (1953) of a reaction between alkyl- and arylidhalogen phosphines and 1,3-dienes led to the establishment of two new P-C bonds. Analysis of this reaction led to the discovery (1959) that the aryl- and alkyldihalogen phosphites are also capable of reacting with dienes which made it possible to synthesize arylphosphinates with the phospholene cycle. Continued analysis of reactions between trivalent phosphorus compounds and conjugate systems indicated that the dienes are bonded not only halides of organic compounds of trivalent phosphorus, but also phosphorus trichloride and phosphorus tribromide. Because trihalogen phosphoranes are extremely reactive compounds they can be synthesized into various phosphacyclopentene derivatives. The insecticidal activity of the compounds is manifested only at high concentrations. Their toxicity for warm-blooded animals is low. The injection of the compounds caused experimental animals to go into a narcosis state which was reversible. Since the symptoms of poisoning with derivative of phospholene resemble those of narcotics, analysis of their interaction with corazole, a typical narcotics antagonist was made. The effect of the prophylactic injection of a dose of certain phosphlene derivatives on the effect of a lethal dose of corazole was determined. Several phospholene derivatives have a bactericidal effect on certain forms of pathogenic microbes. (See also W74-01787) (Auen-Wisconsin)
W74-01791

ORGANOPHOSPHORUS COMPOUNDS CONTAINING A P-N-BOND,
Gosudarstvennyi Nauchno-Issledovatelskii i Proektnyi Institut Azotnoi Promyshlennosti i Produktov Organicheskogo Sinteza, Moscow (USSR).
V. P. Yevadakov, L. I. Mizrakh, Ye. K. Shlenkova, and L. Yu. Sandalova.
In: 'Chemistry and Application of Organophosphorus Compounds', Proceedings of Third Conference. Trans. from Russian Joint Publications Research Service Report 58725, p 86-92. December 1972. 1 tab, 5 ref.

Descriptors: *Organophosphorus compounds, *Chemistry, Chemical reactions, Chemical properties.
Identifiers: *P-N bond, Aminophosphoranes, Phospholene cycle, Acid anhydrides.

Reported are the results of investigations of several questions concerning the chemistry of organophosphorus compounds containing a P-N bond by way of example of compounds of trivalent and pentavalent phosphorus. The specific subject investigated was aminophosphoranes with the phospholene cycle, which are easily synthesized by reacting amidophosphites with alpha-diketones, using diacetyl or cyclo-hexandedione. Analysis of the chemical properties of aminophosphoranes with the reactions of hydrolysis and alcoholysis was the start of establishing that hydrolysis is an oxothermic reaction involving the splitting off of amine and the formation of 2-oxoalkyldialkyl phosphates. The properties of the compounds produced by reacting aminophosphoranes with acid anhydrides are listed. Even within the framework of the reported investigation it is obvious that compounds containing a P-N bond, with phosphorus in the tri- and pentavalent state, are of considerable importance and exhibit tremendous synthetic possibilities. (See also W74-01787) (Auen-Wisconsin)
W74-01792

ANTICHOLINESTERASE PROPERTIES OF CERTAIN ORGANOPHOSPHORUS COMPOUNDS,
Akademiya Nauk SSSR, Moscow. Inst. of Heteroorganic Compounds.
N. N. Godovikov.
In: 'Chemistry and Application of Organophosphorus Compounds,' Proceedings of Third Conference. Trans. from Russian Joint Publications Research Service Report 58725, p 93-103. December 1972. 3 fig, 5 tab, 15 ref.

Descriptors: *Organophosphorus pesticides, *Organophosphorus compounds, *Animal physiology, *Inhibitors, Enzymes, Pesticide toxicity, Chemistry, Biochemistry.
Identifiers: *Organophosphorus inhibitors, Antichloine esterase.

Among the organophosphorus inhibitors (OPI) of choline esterases the thiol derivatives of theiophosphoric and thiophosphonic acids, containing in the beta-position of the bioester radical a heteroatom (sulfur or nitrogen), are of great importance. These include chiefly compounds of the isosystox type and the 'temmeline' preparations. It is known that when acetylcholine reacts with choline esterase the first occurrence is the sorption of acetylcholine as a result of its trimethyl ammonium grouping on the anionic center of the ferment. This creates conditions favorable for the subsequent reaction of acetylcholine with the esterase center, with the result that the hydroxyl of the serin link of the polypeptide chain of the ferment is acetylated. The acetylated ferment is then hydrolyzed by water, producing acetic acid, choline and the activity of the choline esterase is restored. In the first stages choline esterase reacts also with OPI, carrying a positive charge in the thioester radical; the phosphorylated ferment, however, reacts very slowly or not at all with water. Results show that in the presence of a whole positive charge in the heteroatom in the beta-position of the thioester radical the polar and steric effects of the substituents in the phenyl nucleus have little influence on the anticholine esterase activity of OPI. (See also W74-01787) (Auen-Wisconsin)
W74-01793

ON THE INTERACTION BETWEEN ORGANOPHOSPHORUS INHIBITORS AND CHOLINESTERASE,
Akademiya Nauk SSSR, Moscow. Inst. of Evolutionary Physiology.
A. P. Brestkin, I. L. Brik, R. I. Volkova, Ye. V. Rozengart, and A. A. Sagal.
In: 'Chemistry and Application of Organophosphorus Compounds,' Proceedings of Third Conference. Trans. from Russian Joint Publications Research Service Report 58725, p 104-113. December 1972. 3 fig, 5 ref.

Descriptors: *Pesticide kinetics, *Organophosphorus pesticides, *Organophosphorus compounds, *Inhibitors, Chemistry, Carbamate pesticides, Pesticide toxicity, Mathematical studies, Biochemistry.
Identifiers: *Anticholine esterase.

According to current concepts, the reaction of ferments (choline esterases, trypsins, chymotrypsins) with irreversible inhibitors, such as organophosphorus compounds and carbamates, proceeds in two states. This interaction is a variety of consecutive reactions, the kinetics of which were developed in general form by Racovsky. A method of mathematical analysis of the reaction kinetics by formula was applied to experimental data obtained in the laboratory using synthesized preparations. (See also W74-01787) (Auen-Wisconsin)
W74-01794

CERTAIN PROBLEMS IN THE QUANTITATIVE TOXICOLOGY OF ORGANOPHOSPHORUS COMPOUNDS,
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gigieni i Toksikologii Pestitsidov, Kiev (USSR).
Yu. S. Kagan, M. A. Klisenko, and T. N. Pan'shina.
In: 'Chemistry and Application of Organophosphorus Compounds,' Proceedings of Third Conference. Trans. from Russian Joint Publications Research Service Report 58725, p 114-128. December 1972. 5 fig, 5 tab, 24 ref.

Descriptors: *Organophosphorus compounds, *Organophosphorus pesticides, *Pesticide toxicity, *Analysis, Industries, Agriculture, Formulation, Hazards, Public health, Toxins, Lethal limit, Volatility, Acaricides.
Identifiers: *Toxicology, Choline esterase.

The high biological activity of many organophosphorus compounds, and their extensive utilization in industry, agriculture and medicine, necessitates investigation of their toxicology. In toxicology, the establishment of quantitative relationships is complex since the effect of compounds depends substantially on the rate of ingestion, character of distribution and their accumulation in the body, and rate and character of metabolic reactions. Integral toxicity coefficients more completely reflect the differences in toxic properties than the value LD-50. The real hazard of OPC is not only their absolute toxicity (biological activity), but also their capacity to invade the body chiefly through the respiratory system and healthy skin. The so-called effective (two-phase) toxicity, representing the product of toxicity and volatility is used to characterize the risk of a drug entering the body through the respiratory tract. Data on the cumulative coefficients of certain organophosphorus insecticides are presented for warm-blooded animals and insects. The comparatively weak cumulative properties of many OPC distinguish these compounds and makes it extremely promising from the health standpoint to find low-toxic pesticides from among this group. Since many OPC are not only rendered harmless in the animal organism, but also converted to more active anticholine esterase compounds, changes in the anticholine esterase activity were anlyzed. (See also W74-01787) (Auen-Wisconsin)
W74-01795

METATHION--A NEW LOW-TOXICITY ORGANOPHOSPHORUS INSECTICIDE,
Vyzkumny Ustav Agrochemickej Technologie, Bratislava (Czechoslovakia).
S. Trukhlik, I. Drabek, I. Kovach, and S. Gager.
In: 'Chemistry and Application of Organophosphorus Compounds,' Proceedings of Third Conference. Trans from Russian Joint Publications Research Service Report 58725, p 129-138, December 1972. 6 tab, 35 ref.

Descriptors: *Organophosphorus compounds, *Organophosphorus pesticides, *Insecticides, *Toxicity, Formulation, Patents, Birds, Mammals, Analytical techniques, Pesticide residues, Mode of action, Agriculture, Animal parasites, Domestic animals.
Identifiers: *Metathion, *Toxicology, Chlorothione, Osoclorothione, Dicaptone.

On the assumption that molecules have a three-dimensional structure and on data that in many biologically active compounds a chlorine atom can be replaced by a methyl group, O,O-dimethyl-O-(3-methyl-4-nitrophenyl) thiophosphate is the contribution to the synthesis of organophosphorus compounds with low toxicity for warm-blooded animals. Although the differences in toxicity in animals were not surprising, the insecticidal properties of metathion are remarkable. Based on data on the insecticidal and toxicological properties of metathion and a check of its capabilities, a method for its production and application was patented. Metathion is produced by reacting O,O-dimethylchlorothiophospate with alkali salt of 3-methyl-4-nitrophenol or with 3-methyl-4-nitrophenol in the presence of compounds that bond hydrogen chloride. Analytical methods for determining its residues are described. Its comparatively low toxicity to warm-blooded animals is attributed to its capacity to be transformed readily in the organism to less toxic compounds and to the fact that the oxygen analog of metathion is a weaker inhibitor of chloine esterase than paraoxone or methylparaoxone. Metathion is extremely difficult to absorb. It is particularly recommended for combatting flies, cockroaches, mosquitoes, other insects, and farm animal parasites. Its effect against three forms of barn pests were eclipsed only by phenitrothion of 46 insecticides tested. (See also W74-01787) (Auen-Wisconsin)
W74-01796

EXPERIMENTAL INVESTIGATIONS OF THE BIOLOGICAL ACTIVITY OF ORGANOPHOSPHORUS COMPLEXONES,
Institut Gigieny Truda i Professionalnykh Zabolevanii, Moscow (USSR).
O. G. Arkhipova, N. K. Demokidova, T. Ya. Medved, and M. V. Rudomino.
In: 'Chemistry and Application of Organophosphorus Compounds,' Proceedings of Third Conference. Trans. from Russian Joint Publications Research Service Report 58725, p 139-147. December 1972. 3 fig, 4 tab, 9 ref.

Descriptors: *Organophosphorus compounds, *Human diseases, *Toxins, Chelation, Chemicals, Biochemistry, Metals, Trace elements, Metabolsim.
Identifiers: *Complexones, *Medicine, *Pharmacology, Aminoalkylpolyphosphonic acids, Aminopolycarboxylic acids.

The capacity of chelating compounds to form with metals strong intracomplex hydrophilic compounds stimulated the extensive application of complexones in biology and medicine. Information about certain aspects of the effect of aminoalkylpolyphosphonic acids on biological specimens compared with aminopolycarboxylic acids is presented. The importance of the influence of chelating compounds on the elimination of trace elements from the body and the state of the metal complexes present in the body is stressed. The described reactions between complexones and body bio-complexes can be examined from the standpoint of competition between addends for metal. In the case when a complexone acts on metal which is unstably bonded in the biocomplex, as is the case in glycyl-glycine dipeptidase, the metal can be displaced from the biocomplex and its functions destroyed. The data presented are evidence for the fact that organophosphorus complexones are potent agents for the elimination of several toxic metals from the body. They have a number of features in comparison with aminopolycarboxylic complexones. Moreover the mechanism for biological action of these two series of complexones has general features, since during complexone therapy in the organism complex interaction occurs between internally introduced complexones and the biocomplexes. (See also W74-01787) (Auen-Wisconsin)
W74-01797

NUTRIENTS IN NATURAL WATERS.
For primary bibliographic entry see Field 05C.
W74-01798

NITROGEN: SOURCES AND TRANSFORMATIONS IN NATURAL WATERS,
Florida Univ., Gainesville. Dept. of Environmental Engineering.
For primary bibliographic entry see Field 05C.
W74-01799

PHOSPHORUS: ANALYSIS OF WATER, BIOMASS, AND SEDIMENT,
McMaster Univ., Hamilton (Ontario). Dept. of Geology.
For primary bibliographic entry see Field 05C.
W74-01800

THE CARBON CYCLE IN AQUATIC ECOSYSTEMS,
Environmental Protection Agency, Athens, Ga. Southeast Water Lab.
For primary bibliographic entry see Field 05C.
W74-01801

NUTRIENT SUBMODELS AND SIMULATION MODELS OF PHYTOPLANKTON PRODUCTION IN THE SEA,
Washington Univ., Seattle. Dept. of Oceanography.
For primary bibliographic entry see Field 05C.
W74-01804

DETERGENT DEVELOPMENTS AND THEIR IMPACT ON WATER QUALITY,
Procter and Gamble Co., Cincinnati, Ohio. Environmental Water Quality Research Dept.
For primary bibliographic entry see Field 05C.
W74-01807

AN APPROACH TO THE MODELING OF LAKES,
North Carolina Univ., Chapel Hill. Dept. of Environmental Sciences and Engineering.
C. R. O'Melia.
Schweiz Z Hydrol, Vol 34, No 1, p 1-33, 1972, Illus.
Identifiers: Lakes, *Mathematical studies, *Model studies, Water quality.

An approach to the development of predictive models for water quality in lakes is presented. Attention is directed primarily towards lake depth and nutrient loading. Mathematical models pertaining to particular problems are provided.--Copyright 1973, Biological Abstracts, Inc.
W74-01819

WATER POLLUTION, ENVIRONMENTAL ENHANCEMENT STUDY, (4).
Lehigh-Northampton Counties Joint Planning Commission, Lehigh Valley, Pa.
For primary bibliographic entry see Field 05G.
W74-01852

INDEX OF TIME-OF-TRAVEL STUDIES OF THE U.S. GEOLOGICAL SURVEY,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 02E.
W74-01874

WATER QUALITY IN THE CONSERVATION AREAS OF THE CENTRAL AND SOUTHERN FLORIDA FLOOD CONTROL DISTRICT, 1970--72,
Geological Survey, Tallahassee, Fla.
B. F. McPherson.
Open-file report 73014, 1973. 39 p, 5 fig, 16 tab, 4 ref.

Descriptors: *Water quality, *Surface waters, *Florida, *Pollutant identification, *Path of pollutants, Chemical analysis, Dissolved solids, Pesticides, Correlation analysis, Water levels, Drouths, Rainfall, Sampling, Bottom sediments, Fish, Water analysis, Nutrients, Nitrogen, Phosphorus.
Identifiers: Conservation areas.

Selected chemical indicators of water quality in and near the conservation areas in southern Florida in 1970-72 varied with location and season. Dissolved solids generally were highest in the north and northeast where averages ranged from 471 to 641 mg/liter and lowest in the south and west where averages ranged from 172 to 387 mg/liter. Pesticides showed a similar distribution trend. The DDT family (the most commonly detected pesticide) averaged 192 micrograms/kg in bottom sediments in the north of the areas compared with 13.8 micrograms/kg in the south. DDT averaged 723 micrograms/kg in centrarchid fish (bass and sunfish in the north and 264 micrograms/kg in the south. Highest concentrations of polychlorinated biphenyls (PCB's) in bottom sediments were 1,300 and 1,900 micrograms/kg. Concentrations of nitrogen and phosphorus varied more with season or water level than with location. They were highest in June 1971, at the end of a drought; average values were 1.6 mg/liter inorganic N (compared with 0.13 to 0.48 mg/liter at other times), 4.0 mg/liter organic N (compared with 0.8 to 2.5 mg/liter at other times), and 0.05

mg/liter as P (compared with 0.01 to 0.04 mg/liter at other times). (Woodard-USGS)
W74-01881

NUTRIENT CONTENT OF BARNLOT RUNOFF WATER,
Agricultural Research Service, Coshocton, Ohio. Soil and Water Conservation Research Div.
W. M. Edwards, E. C. Simpson, and M. H. Frere.
J Environ Qual. Vol 1, No 4, P 401-405. 1972. Illus.
Identifiers: Cattle, Minerals, Nutrients, *Ohio, Runoff, Seasonal, Water pollution sources, *Farm wastes, *Feed lots.

From March 1968 through Dec. 1970, runoff from a 60-head beef cattle barnlot in Ohio was measured and concentrations of nitrate, total N, P, and K in solution were determined. Nitrate-nitrogen concentration was < 2 mg/l for 8 mo. of the year, with the highest monthly concentration 6 mg/1. Most of the soluble N was in a reduced form with the maximum monthly concentration < 70 mg/1. P concentration was < 5 mg/l during the spring and early summer, with a peak near 14 mg/l in Sept. Monthly K concentration was always < 100 mg/l with peak values > 300 mg/1. Nitrate concentration was highest during warm months when environmental conditions favored oxidation. Concentration of all other nutrient forms decreased during the summer when the barnlot was not being used by cattle. Copyright 1973, Biological Abstracts, Inc.
W74-01890

ARSENIC CONTENT OF FISH FROM NEW YORK STATE WATERS,
Cornell Univ., Ithaca, N.Y. Pesticide Residue Lab.
For primary bibliographic entry see Field 05C.
W74-01900

BIOLOGICAL INCRUSTATION OF WELLS DUE TO MASS DEVELOPMENT OF IRON AND MANGANESE BACTERIA,
Bundesgesundheitsamt, Berlin (West Germany). Institut fuer Wasser-, Boden-, und Lufthygiene.
U. Haesselbarth, and D. Luedemann.
Water Treat Exam. Vol 21, No 1, p 20-29. 1972. Illus.
Identifiers: Bacteria, *Biological incrustation, *Iron bacteria, *Manganese bacteria, *Wells.

Photographic inspection indicated that mineral encrustation results from: hydrated Fe and Mg oxides excreted from masses of Fe and Mg bacteria; general metallic corrosion; and chemical/physical features of well water. Also, SO4-2 reducing bacteria might possibly induce FeS deposits. Bacterial colonies on glass slides suspended in wells were microscopically examined, from which significant chemical factors in the well water were evaluated. Conditions conductive to mass Fe and Mg bacteria growth (and subsequent mineral deposition) were: presence of the bacteria; minimum ion concentrations, e.g., 16 mg/l Fe+2 (standing water) or 1.6 mg/l Fe+2 (flowing water; and increased oxidation reduction potential.--Copyright 1973, Biological Abstracts, Inc.
W74-01902

WATER QUALITY AND WASTE ASSIMILATIVE CAPACITY OF THE PEARL RIVER BELOW BOGALUSA, LOUISIANA,
Geological Survey, Baton Rouge, La.
D. E. Everett, L. D. Fayard, and F. C. Wells.
Louisiana Department of Public Works Water Resources Technical Report No 7, 1973. 28 p, 16 fig, 2 tab, 7 ref.

Descriptors: *Water quality, *Waste assimilative capacity, *Self-purification, Rivers, *Louisiana, Water pollution sources, Municipal wastes, Industrial wastes, Streamflow, Flow rates, *Biodegradation, Biochemical oxygen demand, *Dissolved oxygen, Organic matter, Model studies, Data collections, Correlation analusis.
Identifiers: *Pearl River (La), Bogalusa (La).

The Pearl River downstream from Bogalusa, La., receives wastes from municipal and industrial sources that are equivalent to approximately 30 tons per day of biochemical oxygen demand. The river has an average discharge of 8,500 cfs but cannot assimilate the present biodegradable waste load during low-flow conditions. The concentration of dissolved solids is less than 60 mg per liter 90% of the time, and the occurrence of minor elements is presently not a problem. The pH of the water, which is generally less than 7.0, would be noticeably affected by the discharge of large amounts of acidic or basic wastes, especially during low-flow periods. The disposal of bacteria-laden wastes into the river causes it to be unsafe for primary contact water-recreation uses during low-flow. The effect of biodegradable wastes on the river quality is also emphasized by the drastic changes in the macroinvertebrate communities in the river from above the outfall to Walkiah Bluff. For example, clean-water organisms are present at Bogalusa, absent at Pools Bluff, and present again in Walkiah Bluff. The one-dimensional, mathematical dissolved-oxygen model that relates organic-waste loads to dissolved-oxygen concentration can be used to predict the effect of biodegradable waste on the oxygen concentrations in the river. (Woodard-USGS)
W74-01922

SIGNIFICANCE OF CELLULOSE PRODUCTION BY PLANKTONIC ALGAE IN LACUSTRINE ENVIRONMENTS,
Massachusetts Univ., Amherst. Water Resources Research Center.
For primary bibliographic entry see Field 05C.
W74-01927

A METHODOLOGY FOR DETERMINING OPTIMAL LONGITUDINAL SPACING OF EFFLUENT DISCHARGES INTO A RIVER,
Massachusetts Univ., Amherst. Dept. of Industrial Engineering and Operations Research.
R. Deacon, and R. J. Giglio.
Available from the National Technical Information Service as PB-225 698 $9.00 in printed copy, $1.45 in microfiche. Massachusetts Water Resources Research Center, Amherst, Publication No. 22, 1971. 131 p, 16 fig, 17 tab, 38 ref. OWRR B-011-MASS (9).

Descriptors: Water pollution sources, *Mathematical studies, *Outlets, *Cost analysis, Data processing, Dissolved oxygen, Biochemical oxygen demand, *Dispersion, Mixing, Waste water treatment, Water quality control, Effluent streams, *Optimal development plans.
Identifiers: *Stream assimilative capacity, Algorithms, Effluent discharges.

The consequence on cost and water quality of discharging waste-water effluent through outfalls spaced along a river is examined. Compared to the conventional one-outfall case the effluent from a plant discharging through several outfalls can be of lower quality and still not violate stream standards. Thus the reduced cost of treatment can compensate for the added cost of the more elaborate transport system. A model of the stream characteristics based on the Camp-Dobbins equations was combined with a model representing the costs of water treatment and disposal. An algorithm has been developed and programmed to find the minimum cost configuration for any set of water and economic conditions. The level of sophistication of this model should be sufficient to justify its use in actual planning situations and consequently special attention is given to specifying the data required for its use. Results of test runs using realistic data indicate that using multiple outfalls often provides improved stream quality at reduced cost. This is true whether minimum dissolved oxygen, average dissolved oxygen or combination of the two are used as measures of stream quality. Results also indicate that a multiple outfall system is less sensitive to increases in BOD loadings caused by a growing population.
W74-01928

HEAT AND WATER VAPOR EXCHANGE BETWEEN WATER SURFACE AND ATMOSPHERE,
Cornell Univ., Ithaca, N.Y. School of Civil and Environmental Engineering.
For primary bibliographic entry see Field 02D.
W74-01930

MEASUREMENTS PROGRAM FOR OIL-SLICK CHARACTERISTICS--FINAL REPORT,
Michigan Univ., Ann Arbor. Willow Run Labs.
R. Horvath, W. L. Morgan, and R. Spellicy.
Available from NTIS, Springfield, Va 22151 AD-758 591 Price $6.00 printed copy; $1.45 microfiche. Final Report 2766-7-F, February 1970. 179 p, 110 fig, 13 ref, 2 append. DOT-CG-92580-A.

Descriptors: *Water pollution sources, *Oil spills, *Path of pollutants, *Remote sensing, *Spectroscopy, Light, Reflectance, Refractivity, Fluorescence, Mathematical models, Evaluation.
Identifiers: *Oil-slick detection.

Summarized are results of a laboratory investigation utilizing the spectral region from the ultraviolet to the infrared for determining oil-slick characteristics. Included are data obtained from measurements of absorptance, index of refraction, emissivity, and fluorescence for a variety of crude oils and petroleum products. A mathematical model is developed for using these quantities to determine the spectral radiance from oil films on smooth water in an outdoor environment. Conclusions are discussed and recommendations are made for future work to apply these results to the selection, design and evaluation of remote sensing for oil-slick detection. (Woodard-USGS)
W74-01941

MATHEMATICAL SIMULATION OF SALINITY IN THE SACRAMENTO ROVER SYSTEM,
California State Dept. of Water Resources, Sacramento.
J. C. Mosley.
Available from State of Calif, Documents Section, P.O. Box 20191, Sacramento, Calif 95820 Price $2.00. Bulletin No 156, August 1971. 72 p, 21 fig, 12 tab, 27 ref, 3 append.

Descriptors: *Streamflow forecasting, *River basins, *Salinity, *Water quality, *California, *Mathematical models, Equations, Data collections, Electrical conductance, Correlation analysis, Tributaries, Inflow, Reservoirs, Reservoir releases, Discharge (water), Municipal wastes, Industrial wastes, Analytical techniques, Projections, Water supply.
Identifiers: *Sacramento Valley (Calif).

The Sacramento Valley, California, Water quality model simulates mathematically the monthly flow-weighted mean electrical conductivity (EC) by reaches in the Sacramento River system. Using readily available flow and EC data, the model was developed around the system's three general types of flow: unregulated tributary inflow; reservoir impoundments and releases; and valley floor accretions or depletions. The latter was further broken down into storm-water runoff, irrigation return flow, municipal and industrial waste discharges, diversions of streamflow for beneficial use, weir spills, and unmeasured inflows and losses. Flow and EC data for all inflows, diversions and other losses were combined in a series of equations in which mean monthly EC was

weighted with quantities of flow. Model outputs were flowweighted mean EC in micromhos, salt loading in tons and corresponding rates of streamflow in acre-feet at 12 locations in the system for each month of a selected time period. The model was verified by comparing computed EC values with prototype values at selected river stations. The model was used to estimate the probable future EC at each station in the system under a projected 1990 level of development. Results showed an increase in flow-weighted average EC, but no monthly values were great enough to threaten any beneficial uses of the Sacramento River. (Woodard-USGS)
W74-01944

ACIDOPHILIC THIOBACILLI IN THE RIVER SIRPPUJOKI,
Helsinki Univ. (Finland). Dept. of Microbiology.
S. I. Niemela, and O. H. Touvinen.
J Gen Microbiol. Vol 73, No 1, p 23-28. 1972. Illus.
Identifiers: *Finland (River Sirppujoki), Rivers, *Thiobacilli (Acidophillic), *Iron bacteria.

Numbers of acidophilic thiosulfate-oxidizing and iron-oxidizing thiobacilli in the River Sirppujoki (SW Finland) were monitored through one annual cycle. A number of physical and chemical environmental variables of the river water were determined (temperature, discharge, pH values, titratable acidity, and concentrations of Mn, Fe and sulfate). Thiobacilli in river water appeared mainly to have been washed in from the soil. Once in the river a slow loss of viability occurred, strongly influenced by the temperature. The methods for quantitative colony counts of acidophilic thiobacilli were deemed unsatisfactory.--Copyright 1973, Biological Abstracts, Inc.
W74-01946

BASIC DIRECTIONS OF SCIENTIFIC INVESTIGATIONS IN THE PROTECTION OF SURFACE WATERS FROM POLLUTION (OKHRANA POVERKHNOSTNYKH VOD OT ZAGRYAZNENIYA (OSNOVNYYE NAPRAVLENIYA NAUCHNYKH ISSLEDOVANIY)),
Akademiya Nauk SSSR, Moscow, Institut Vodnykh Problem.
O. T. Bolotina, and I. P. Kanardov.
Vodnyye Resursy, No 3, p 53-64, 1972.

Descriptors: *Water quality control, *Water pollution control, *Water pollution sources, *Water pollution effects, *Surface waters, Agricultural chemicals, Fertilizers, Industrial wastes, Waste water treatment, Eutrophication.
Identifiers: *USSR.

Sources of pollution of natural waters and their effects on water quality of open bodies of water are discussed. Measures which will help stop pollution of the water medium are analyzed, and attention is focused on the need to apply a complex of measures to control water pollution sources and water quality. Five basic directions of investigations are proposed: (1) reduction or elimination of pollution sources: (2) improvement of industrial techniques of wastewater treatment; (3) utilization of natural conditions to restore the quality of waters containing residual contaminants; (4) investigation and development of methods to control water-quality characteristics of natural bodies of water; and (5) improvement of water-quality estimates in connection with man's activities. (Josefson-USGS)
W74-01967

SUBSURFACE QUALITY TRANSFORMATIONS DURING THE INITIATION OF A NEW STABILIZATION LAGOON,
Arizona Univ., Tucson. Water Resources Research Center.
For primary bibliographic entry see Field 05D.
W74-01972

SOME NATURAL PHYSICAL PROCESSES AFFECTING THE RECOVERY OF THE GREAT LAKES,
Ohio State Univ., Columbus.
T. Y. Li.
In: Proceedings 19th Annual Technical Meeting, 'Realism in Environmental Testing and Control' April 2-5, 1973, Anaheim, California, p 416-423, 1973. OWRR X-117 (No 3724) (2).

Descriptors: *Self-purification, *Pollutants, *Distribution patterns, Physical properties, *Great Lakes, Heat budget, Flow, Stratification, Thermodynamics, Mathematical studies, Mixing, Currents (Water), Circulation, Dispersion, Waves (Water), Turbulence, Sedimentation.

Important physical processes affecting self-improvement of the Great Lakes include natural flow with removal time estimate, temperature distribution, transport and mixing by wind (circulation, Coriolis effects, and dispersion of contaminants, waves, windrows, seiches), and sedimentation. The addition of new influent materials constitutes a perturbation on the thermodynamic state of the lake in such a manner that is will tend towards a new thermodynamic state by a relaxation process. A pollution abatement potential concept is introduced on the basis of a non-linear kinetic equation. Results of some theoretical studies tend to suggest that the thermal body force does play an important role in generating the mean lake circulation pattern. The energy inputs into the lake that are largely responsible for mixing and movement of its water, directly or indirectly, are the thermal forces. For the study of water transport and mixing, effects of geometrical constraint of the lake basin and the effects of inflow into and outflow from the lake are considered. The sediment, besides recording significant changes in the drainage basin, also plays an important role in the lake's metabolism. Water turbidity is largely an indicator of the amount of suspended particles. (Jones-Wisconsin)
W74-01974

MERCURY POLLUTION OF LAKE ERIE ECOSPHERE,
Pennsylvania State Univ., University Park. Dept. of Nuclear Engineering.
K. K. S. Pillay, C. C. Thomas, Jr., J. A. Sondel, and C. M. Hyche.
Environ Res. Vol 5, No 2, p 172-181. 1972. Illus.
Identifiers: Algae, Brain, *Ecosphere, Fish, Human, Lakes, *Mercury, Plankton, Pollution, *Neutron activation analysis, *Lake Erie.

The distribution of Hg in the ecosphere of Lake Erie was monitored with a highly sensitive and reliable neutron activation analysis procedure. A variety of samples from the fauna and flora of the lake as well as those from its immediate environment were analyzed for their Hg content. The results indicate a widespread distribution of Hg in air particulates; coal samples of the region; sediments, plankton/algae and fish samples from the lake; and in the brain tissues of long-time residents of the Lake Erie Basin.--Copyright 1973, Biological Abstracts, Inc.
W74-01985

EROSION OF AZINPHOSMETHYL FROM APPLE LEAVES BY RAIN AND OVERTREE IRRIGATION,
Department of Agriculture, Summerland (British Columbia). Research Station.
A. D. Mc Mechan, V. G. Morgan, and G. A. Wardle.
J Entomol Soc B C. 69: p 5-8. 1972. Illus.
Identifiers: *Apple leaves, *Azinphosmethyl, Erosion, *Irrigation (Overtree), Laspeyresia-Pomonella, Rain, Moth control.

Three sprays of azinphosmethyl wettable powder were applied for seasonal control of the codling moth, Laspeyresia pomenella (L.), in a semi-dwarf apple orchard. A rain of 1.75 cm, occurring 6 hr after a spray application, removed 41% of the deposit from the leaves; a rain of 1.00 cm, occurring 16 days after an application, did not remove any residue. Residues in the treetops were eroded more rapidly in blocks with overtree irrigation than in those with undertree irrigation. But there was no difference in the erosion rate in the overtree-irrigated orchard whether 5.1 cm of water was applied biweekly or 2.5 cm was applied weekly. There was a trend to poorer control of the codling moth with overtree irrigation.--Copyright 1973, Biological Abstracts, Inc.
W74-01992

UREA AND OTHER NITROGENOUS NUTRIENTS IN LA JOLLA BAY DURING FEBRUARY, MARCH AND APRIL 1970,
Johns Hopkins Univ., Baltimore, Md. Chesapeake Bay Inst.
J. J. Mc Carthy, and D. Kamykowski.
U S Natl Mar Fish Serv Fish Bull. Vol 70, No 4, p 1261-1274. 1972. Illus.
Identifiers: Bays, *California (La Jolla Bay), Chlorophyll, *Nitrogenous compounds, Nutrients, Phaeo, Pigments, Prionace-Glauca, *Urea, *Blue shark infection.

Samples collected from La Jolla Bay California, twice weekly for 2 1/2 mo. were analyzed for nitrate, nitrite, ammonium and urea in addition to other chemical, physical, and biological parameters. On the basis of an infestation of blue sharks (Prionace glauca), periods before, during and after the infestation were defined. Statistical analyses indicated that urea concentrations were highest during the period of shark infestation. There was strong positive correlation between phaeo-pigment/chlorophyll ratios and ammonium concentrations during the infestation but none between the pigment ratios and either the ammonium concentrations for the other 2 periods or the urea concentrations for any of the 3 periods. There was no correlation between ammonium and urea concentrations before, a strong positive correlation during, and no correlation after the shark infestation. Urea was the only nitrogenous nutrient for which the concentrations above and below the thermocline were not different. Comparisons between 2 stations 1.5 km distant indicate that on a horizontal scale, the patch structure for urea is smaller than that of the other nitrogenous nutrients although the median urea concentration in the water column was not different at the 2 stations. The temporal similarity and the more complex patch structure for urea suggest that the blue sharks were responsible for the higher urea concentrations during the infestation. Although the median ammonium concentrations before and during the infestation were not different, the strong positive correlation between ammonium and urea concentrations during the infestation hint that the sources or rates of supply and utilization for both nutrients may have been closely related. The strong positive correlation between phaeo-pigment/chlorophyll ratios and ammonium concentrations during the infestation may imply that the source of ammonium was herbivore excretion.--Copyright 1973, Biological Abstracts, Inc.
W74-01993

ENVIRONMENTAL POLLUTION, A SURVEY EMPHASIZING PHYSICAL AND CHEMICAL PRINCIPLES,
Iowa State Univ., Ames. Dept. of Physics.
L. Hodges.
Holt, Rinehart and Winston, Inc., New York, N.Y., 1973. 370 p. $7.95.

Descriptors: *Environmental effects, Pollutants, *Water pollution sources, Industrial production, Biology, Biomass, Ecology, Economics, Food chains, Population, *Radioactivity effects, *Cost-benefit ratio, Projections, Pesticide toxicity, *Toxicity, Public health.

An introduction is presented to the important subject of environmental pollution. There is considerable feeling today that we must press scientific development to eliminate pollution for our survival. Environmental pollution is the unfavorable alteration of our surroundings, wholly or largely as a by-product of man's actions, through direct or indirect effects of changes in energy patterns, radiation levels, chemical and physical constitution and abundances of organisms. These changes may affect man directly or through his supplies of water and of agriculture and other biological products, his physical objects or possessions, or his opportunities for recreation and appreciation of nature. An important tool in pollution assessment, the benefit-vs-cost concept, is considered. (Houser-ORNL)
W74-02002

AQUATIC AND ATMOSPHERIC SIMULATION,
California Univ., Livermore. Lawrence Livermore Lab.
J. B. Knox, D. M. Hardy, and C. A. Sherman.
Available from NTIS, Springfield, Va., as UCRL-51405; $4 in paper copy, $1.45 in microfiche. Report UCRL-51405, June 1973. 11 p, 8 fig, 15 ref.

Descriptors: *Mathematical models, Water pollution, *Environmental effects, *Estuarine environment, Bays, Air pollution, *Path of pollutants, Tracers, Model studies, Hydraulic models, *California, *Simulation analysis.
Identifiers: San Francisco Bay.

Mathematical models developed at Lawrence Laboratory are reviewed, those both for aquatic systems and for atmospheric systems (that may be adapted to aquatic systems). Dredge disposal on a small scale may be simulated by a hybrid (Lagrangian-Eulerian) 3-dimensional code for atmospheric dispersion of particles (ADPIC). For regional-scale systems such as the San Francisco Bay which require long-term numerical integration, a model developed to describe advective-diffusive transport for air pollution may be applied. Validation of the model would require either on-site tracer experiments or comparison of calculated fluxes with those measured in one of the Corp of Engineers' physical models. (Bopp-ORNL)
W74-02003

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE BEAVER VALLEY POWER STATION, UNIT 1.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 05C.
W74-02004

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE BEAVER VALLEY POWER STATION, UNIT 2.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 05C.
W74-02005

FINAL ENVIRONMENTAL STATEMENT RELATED TO OPERATION OF TROJAN NUCLEAR PLANT.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 05C.
W74-02006

REPORT ON RELEASES OF RADIOACTIVITY IN EFFLUENTS AND SOLID WASTE FROM NUCLEAR POWER PLANTS FOR 1972.
Directorate of Regulatory Operations (AEC), Washington, D.C.

Available from Assistant Director for Radiological, Environmental and Materials Protection; Directorate of Regulatory Operations; Washington, D.C. 20545, Free. August 1973. 68 p, 34 tab.

Descriptors: *Nuclear powerplants, *Effluents, *Radioactivity, *Air pollution, *Water pollution, *Water pollution sources, Nuclear wastes, Data collections, Gases, Liquid wastes, Solid wastes, Regulation, Legal aspects, Administrative agencies, Public health.

A tabulation is presented of radioactivity in effluents and solid waste from nuclear power plants for calendar year 1972. The data included are those reported by the licensee except for certain calculations made by the Regulatory staff. A similar report was made for 1971. This report shows that the radioactivity in effluents from licensed nuclear power plants has generally been low in comparison with the limits set forth in the Atomic Energy Commission's Part 20 of Title 10, Chapter 1, Code of Federal Regulations, 'Standards for Protection Against Radiation'. (Houser-ORNL)
W74-02011

EFFECTS OF OCEAN WATER ON THE SOLUBLE-SUSPENDED DISTRIBUTION OF COLUMBIA RIVER RADIONUCLIDES,
Oregon State Univ., Corvallis.
For primary bibliographic entry see Field 05C.
W74-02012

GROUND DISPOSAL OF REACTOR COOLANT EFFLUENT,
Battelle-Pacific Northwest Labs., Richland, Wash.
J. R. Eliason, and B. F. Hajek.
Available from NTIS, Springfield, Va., as Rept. BNWL-CC-1352. $4.00 per copy, $1.45 per microfiche. Report No. BNWL-CC-1352, September 1967. 19 p, 12 fig, 2 tab, 6 ref.

Descriptors: *Coolant, *Nuclear powerplants, *Effluent, *Radioactive waste, *Radioactive waste disposal, Groundwater, Hydrogeology, Groundwater pollution, Groundwater movement, Water pollution sources, Water pollution treatment, Ion exchange, Absorption, Radioisotopes, Chromium, Zinc.

A study in which reactor coolant effluent was disposed to an existing trench at 100-D Area was conducted for a four-month period, March-June 1967. During this time 3.367 x 10 (9) gallons of effluent were infiltrated at an average rate of 1277 gal/day/ft sq. Groundwater elevations and temperatures increased in the vicinity of 100-D; however, no significant decrease in infiltration rate occurred. Decontamination factors ranged from 2.5 for Cr-51 to greater than 276 for Zn-65. These are probably minimum decontamination factors since the route followed by wastes moving from the trench to the springs is considered to be the path having the shortest travel time. Groundwater elevations quickly returned to near pre-test levels upon termination of disposal; however, groundwater temperatures are decreasing slowly. This study showed that large volumes of reactor coolant effluent can be disposed to the ground for significant periods of time. The decontamination achieved is probably greater than could be obtained by any other treatment process. (Houser-ORNL)
W74-02013

RADIOACTIVE WASTE MANAGEMENT IN ITALY,
Comitato Nazionale per L'Energia Nucleare, Rome (Italy).
For primary bibliographic entry see Field 05D.
W74-02014

THE MONITORING OF TRITIUM IN THE AQUATIC ENVIRONMENT OF POWER REACTORS,
Radiation Management Corp., Philadelphia, Pa.
S. W. Porter, Jr.
Available from Messenger Graphics, Pub., Phoenix, Ariz., $35.00 per copy. In: Tritium, p 517-521, May 1973. 3 fig, 8 ref.

Descriptors: *Tritium, Measurement, *Monitoring, *Pennsylvania, *Maryland, *Radioactivity, Rainfall, Rivers, Watersheds (Basins), Water pollution sources, Surface waters, Water wells, Effluent, Nuclear powerplants, Nuclear detonation, Susquehanna River, Public health.

A coordinated tritium sampling program has been initiated in the Pennsylvania-Maryland area by the Radiation Management Corporation. Tritium is measured in rainfall, river water, public drinking water, and well water from the various watersheds. In addition, after the start-up of nuclear generating stations, the program includes reactor discharge water measurements. The object of this regional sampling program is to measure background levels of tritium and their variations (seasonal, etc.), as well as to measure the contribution from nuclear generating stations. (Houser-ORNL)
W74-02015

ANALYSIS FOR TRITIUM IN WATER: INTERCOMPARISON STUDY OF NOVEMBER 1970,
Analytical Quality Control Service, Winchester, Mass.
E. J. Baratta.
Available from Messenger Graphics, Pub., Phoenix, Ariz., $35.00 per copy. In: Tritium, p 522-530, May 1973. 9 fig, 4 tab, 4 ref.

Descriptors: *Tritium, *Analysis, *Analytical technique, *Assay, *Bioassay, *Water, Water quality control, Sampling, Administrative agencies, Statistical methods, Average.

A procedure of quality control to assist laboratories in producing accurate and comparable data on tritium concentrations in water is necessary. The Analytical Quality Control Service (AQCS) has attempted to aid this endeavor. In addition to conducting an interlaboratory tritium cross-check program, the AQCS conducted this intercomparison study in November 1970, to assist the laboratories in evaluating their precision and accuracy. Three different levels of tritium were used, including a biological sample, to study the response of tritium radiochemical techniques as used by each laboratory. These levels are above those normally found in the environment so that the laboratories may isolate, identify, and correct any problems associated with their analyses. One problem that arose was unforeseen. The activity of the spiked solution was four percent low from that originally reported. This was first detected by observing that the data from all the laboratories seemed to be biased low. (Houser-ORNL)
W74-02016

TRITIUM RELEASES FROM NUCLEAR POWER STATIONS,
National Environmental Research Center, Cincinnati, Ohio.
H. L. Krieger, S. Gold, and B. Kahn.
Available from Messenger Graphics, Pub., Phoenix, Ariz., $35.00 per copy. In: Tritium, p 557-564, May 1973. 4 tab, 27 ref.

Descriptors: *Tritium, *Radioactivity, *Effluent, *Nuclear powerplants, Nuclear energy, Productivity, Environmental effects, Water pollution, Air pollution, Soil contamination, Absorption, Public health, Forecasting, Projections.
Identifiers: *Fuel reprocessing.

Tritium in effluents from nuclear power stations and associated facilities is of particular interest because it is the most prevalent radionuclide in liquid wastes and is exceeded among long-lived radionuclides in gaseous effluents only by Kr85. Fortunately, the radiation hazard per curie of tritium is low compared to most other radionuclides, because tritium releases relatively little energy per disintegration and has a short residence time in the human body. Nevertheless, due to its relatively high concentrations, tritium may be the critical radionuclide for calculating population radiation exposures at a number of nuclear power facilities. The release of tritium to the environment at routinely operating nuclear power stations and at a fuel reprocessing plant is reviewed on the basis of production estimates, operating reports by these facilities, and data from radiological surveillance studies. The latter were performed at a boiling-water reactor, a pressurized-water reactor, and a fuel-reprocessing plant. (Houser-ORNL)
W74-02017

ENVIRONMENTAL TRITIUM CONTAMINATION FROM NUCLEAR POWER PROGRAM,
Bhabha Atomic Research Centre, Bombay (India). Health Physics Div.
V. K. Gupta, and S. D. Soman.
Available from Messenger Graphics, Pub., Phoenix, Ariz., $35.00 per copy. In: Tritium, p 564-571, May 1973. 4 fig, 2 tab, 12 ref.

Descriptors: *Tritium, *Nuclear powerplants, *Effluent, *Nuclear energy, *Productivity, *Environmental effects, Air pollution, Water pollution, Soil contamination, Public health, Forecasting, Measurement, Assay, Population, Food chains.
Identifiers: *Fuel reprocessing.

The estimate for the growth of electrical power in India by the end of fourth five-year plan, i.e., 1974, is 23 GWe. Assuming a consumption growth rate of 12%, the country will need about 45 GWe of installed capacity by 1980. The Indian Atomic Energy Commission, in its recent publication on the growth of atomic energy, has proposed that about 2700 MWe power should be generated by 1980 from nuclear energy. The Commission has indicated that these nuclear power stations will be of CANDU design, utilizing heavy water as both moderator and coolant and natural U02 as fuel. By 1980, three fuel reprocessing plants are expected to process the irradiated fuel from the power reactors. It is proposed that one fast breeder reactor (40 MW) will be built to provide a base for the fast breeder power stations expected after 1980. Tritium is a radionuclide of interest because of its radiological properties and appreciable production. It is released to the environment as a consequence of normal operation in both nuclear power reactors and fuel reprocessing plants. (Houser-ORNL)
W74-02018

TRITIUM GENERATION AND RELEASE TO IN-PLANT AND OFF-SITE ENVIRONS OF THE LA CROSSE BOILING WATER REACTOR,
Dairyland Power Cooperative, LaCrosse, Wis.
T. A. Steele.
Available from Messenger Graphics, Pub., Phoenix, Ariz., $35.00 per copy. In: Tritium, p 585-591, May 1973. 2 fig, 2 tab, 6 ref.

Descriptors: *Tritium, *Effluent, *Nuclear powerplants, *Wisconsin, Environment, *Environmental effects, Population, Air pollution, Water pollution, Water pollution sources, Food chains, Public health, Measurement, Equilibrium, Path of pollutants, Meteorology.

A large percentage of tritium produced in a direct cycle boiling water reactor utilizing stainless-steel cladding, such as the La Crosse Boiling Water Reactor (LACBWR), is released to the primary water and plant environs and eventually to the environment. The percentage of the tritium produced by ternary fission which is released at LACBWR is mostly a function of the primary water concentration and, hence, the amount diffusing through the fuel cladding. The primary pathway to the environment is liquid waste and possible condenser cooling water. During recent months of LACBWR operation, from 50 to 95% of the tritium produced from ternary fission was released if equilibrium conditions are assumed. The diffusion mechanism appears to be the primary pathway of leakage to the environment. Additional investigation is necessary to both quantify and determine the release mechanism of tritium through the surface condenser. (Houser-ORNL)
W74-02019

ENVIRONMENTAL TRITIUM SURVEILLANCE FOR PROJECT RULISON,
National Environmental Research Center, Las Vegas, Nev.
D. T. Wruble, V. E. Andrews, and G. A. Boysen.
Available from Messenger Graphics, Pub., Phoenix, Ariz., $35.00 per copy. In: Tritium, p 592-602, May 1973. 1 fig, 3 tab, 9 ref.

Descriptors: *Tritium, *Nuclear energy, Secondary recovery (Oil), *Natural gas, Hydrofracture, Effluent, Air pollution, Water pollution, *Radioactivity, Water pollution sources, Monitoring, Surveys, Public health, Population.

The off-site surveillance program for the reentry and production test phases of project RULISON was designed to monitor the environment for tritium and Kr85 in particular. The program was also designed to monitor for C14 and other radioactive products that might be released from the test well. Because of the relative ease of collecting atmospheric moisture for tritium analysis and the somewhat greater public health significance expected for the released tritium, it was chosen as the radionuclide for routine air surveillance. Net Kr85 concentrations could be estimated from net tritium concentrations and from the measured ratio of the two gases at the wellhead. In addition, tritium would be the only radionuclide expected in other environmental samples. The procedures and results are reported of the off-site tritium monitoring program conducted during the reentry and production testing phases by the Western Environmental Research Laboratory. (Houser-ORNL)
W74-02020

EXPERIMENTAL RESULTS FROM PROCESSING GASBUGGY GAS IN A NATURAL GAS PROCESSING PLANT,
Oak Ridge National Lab., Tenn.
M. J. Kelly, C. J. Barton, A. S. Meyer, E. W. Chew, and C. R. Bowman.
Available from Messenger Graphics, Pub., Phoenix, Ariz., $35.00 per copy. In: Tritium, p 603-611, May 1973. 3 fig, 4 tab, 6 ref.

Descriptors: *Tritium, *Natural resources, *Oil, *Natural gas, *Nuclear explosions, Nuclear engineering, Secondary recovery (Oil), Water pollution, Soil contamination, Public health, Monitoring, Radioactivity, Moisture, Adsorption, Analytical techniques, Assay, Bioassay, Human pathology, Epidemiology, Hydrofracturing, Industrial production.
Identifiers: Plowshare, Gasbuggy, Rulison.

The use of nuclear devices to increase natural gas production from otherwise unproductive gas fields has been tested in the Gasbuggy and Rulison experiments. Other tests are planned. The use of such nuclear devices results in low levels of tritium and Kr85 in the natural gas produced from such wells. Studies in the Health Physics Division of the Oak Ridge National Laboratory (ORNL) are providing estimates of the potential radiation dose that might occur through the use of gas produced from nuclearly stimulated wells. An experiment was performed in cooperation with El Paso Natural Gas Company (EPNG) to test the validity of prior calculations on the distribution of tritium among the various processing plant products ('dry' gas, butane, propane, and natural gasoline), to determine if isotopic exchange occurs between tritiated components of natural gas and the absorption oil used for product extraction, and to study the exposure of plant operating personnel during the processing of gas from a nuclearly stimulated well. (Houser-ORNL)
W74-02021

ENVIRONMENTAL TRITIUM STUDIES AT A PWR POWER PLANT,
New York Univ. Medical Center, N.Y.
L. K. Cohen, and T. J. Kneip.
Available from Messenger Graphics, Pub., Phoenix, Ariz., $35.00 per copy. In: Tritium, p 623-639, May 1973. 6 fig, 6 tab, 19 ref.

Descriptors: *Tritium, *Air pollution, *Water vapor, Hydrologic cycle, *Water pollution, Water pollution sources, Nuclear explosions, Measurement, Assay, Bioassay, Radioactivity, Biota, Sediments, Behavior, Ecology, Environment, Monitoring, Sampling, Water analysis, *Hudson River, Nuclear powerplants, Effluents, Public health, *New York.
Identifiers: Indian Point (NY), *Pressurized water reactor.

Tritium produced by natural or artificial processes in the atmosphere is oxidized to form water, and follows the hydrologic cycle. Before the introduction of large quantities by thermonuclear detonations, levels of tritium in the environment were very low and were studied only as a scientific curiosity. Because of the extremely low concentrations of tritium even after the advent of bomb tests and the resulting measuremnt problems, the retention or incorporation characteristics of tritium in biota and sediment in the organically bound state are not well known. With the expansion of the nuclear power industry, increased quantities of tritium are expected to be released in localized areas, and there is a need to know more about the behavior of tritium in the environment. This study was designed to define the relative concentrations of tritium in several compartments of an estuarine environment. Measurements were made of tritium in the loose and organically bound water in bottom sediments, rooted aquatic plants, fish, and ambient water. The area selected for this study was a 30 mile section of the Hudson River estuary which includes the nuclear power facility at Indian Point. This pressurized water reactor has been in operation since 1962 and is presently releasing 400 to 1100 curies of tritium per year to the estuary. (Houser-ORNL)
W74-02022

TRITIUM INTAKE IN NEW YORK,
New York Operations Office (AEC), N.Y. Health and Safety Lab.
D. C. Bogen, C. A. Henkel, C. G. C. White, and G. A. Welford.
Available from Messenger Graphics, Pub., Phoenix, Ariz., $35.00 per copy. In: Tritium, p 639-646, May 1973. 6 tab, 9 ref.

Descriptors: *Tritium, *Radioisotopes, *Biological control, Biology, *Biological communities, *Ecosystems, *Food chains, Human pathology, Epidemiology, Public health, Bioassay, Assay, Analystical techniques, Air pollution, Water pollution, Domestic water, New York.
Identifiers: *New York City.

Tritium has been considered one of the least hazardous of the radioactive isotopes, partly because of its low energy beta-particles of 18 keV maximum and because the maximum penetration range is 5 micrometers for unit density matter.

Also, the biological half-life is relatively short (8 to 14 days for man) and large doses are tolerated by experimental animals. Woodard has stated that about 2% of the tritium intake, as tritiated water, is incorporated into tissue compounds and that the biological half-lives are much longer, about 20 to about 400 days. According to Woodard, incorporation of tritium as tritiated water into body components is rapid, and tritium is observed in two compartments. The first compartment is tissue free water tritium, which is removed from the sample by mild distillation techniques or lyophilization. The second compartment is the dried tissue which is ashed and the water of combustion measured for tissue combined tritium. In a dietary study, samples were freeze dried to obtain the free water tritium and then the dried residue was combusted and the water of combustion measured for the combined tritium. (Houser-ORNL)
W74-02023

SOME CHARACTERISTICS OF SOIL AND PERENNIAL VEGETATION IN NORTHERN MOJAVE DESERT AREAS OF THE NEVADA TEST SITE,
California Univ., Los Angeles. Lab. of Nuclear Medicine and Radiation Biology.
E. M. Romney, V. Q. Hale, A. Wallace, O. R. Lunt, and J. D. Childress.
Available from NTIS, Springfield, Va., as UCLA-12-916; $10.60 in paper copy, $1.45 in microfiche. Report UCLA-12-916, June 1973. 340 p, 6 tab, 67 ref.

Descriptors: *Desert plants, *Fallout, *Vegetation regrowth, On-site data collections, Speciation, Plant physiology, Radioisotopes, Absorption, Cycling nutrients, Soil properties, Bibliographies, *Nevada, Ecology, *Soil-water-plant relationships, Soil moisture, Radioecology, Rainfall.
Identifiers: *Mojave Desert (Nev).

This document and an earlier volume (see W73-04300) contain results from a five-year team research effort to obtain information on soil and plant relationships in the desert biome for use in future ecosystems-analysis work concerning the impact of nuclear testing. This volume compiles (1) the modifying effects of shrubs on the physical and chemical characteristics of soil and profiles, (2) the volume and biomass of perennial vegetation, (3) mineral element compositions of the prominent plant species, (4) Cs137, K40, U, and Th in surface soil, (5) rainfall, air temperature, soil temperature, and soil moisture. (Bopp-ORNL)
W74-02024

RADIOTRACER TECHNIQUE FOR THE STUDY IN VIVO OF THE BIOLOGICAL PATHWAY OF HEAVY METALS IN AQUATIC ORGANISMS,
European Atomic Energy Community, Ispra (Italy). Joint Nuclear Research Center.
For primary bibliographic entry see Field 05C.
W74-02025

DISPOSAL OF WASTE HEAT,
Department of the Interior, Washington, D.C. (Assignee).
A. Cywin.
U. S. Patent No. 3,760,868, 3 p, 2 fig, 1 ref; Official Gazette of the United States Patent Office, Vol 914, No 4, p 1271, September 25, 1973.

Descriptors: *Patents, Water supply, Domestic water, *Pollution sources, *Thermal pollution, *Heat exchange, *Pollution abatement, Heated water, Power plants.

The soil mass surrounding the mains and laterals of municipal domestic water distribution system is used as a heat sink for the waste heat produced as a by-product of power generation. After absorbing heat in a heat exchanger, the stream is passed to the distribution network making up the municipal water supply system. Water introduced in this manner tends to reach temperature equilibrium with the surrounding ground mass. Waste heat from a power plant or other industrial process is distributed over a wide area. Some treatment of the water is often necessary to prevent fouling and plugging of the heat exchanger. (Sinha - OEIS)
W74-02029

FLOATABLE-SUBMERSIBLE VESSEL CONTAINER,
Nuclear Waste Systems Co., Campbell, Calif. (assignee).
J. Mertens.
U. S. Patent No. 3,760,753, 4 p, 9 fig, 2 ref; Official Gazette of the United States Patent Office, Vol 914, No 4, p 1241, September 25, 1973.

Descriptors: *Patents, *Radioactive wastes, *Waste disposal, *Water pollution sources, Equipment, Oceans.

A vessel container is described which may be used for storing contaminants, such as radioactive waste material. The container is adapted to float on the sea surface while carrying large volumes of contaminant material. The container can be towed to sea for sinking. It is further adapted to provide for pressure equalization while sinking. The vessel may also be adapted for subsequent retrieval, if desired. A cylindrical shell with end covers is constructed of ferro-cement or other suitable material for sealing radiation from the contaminant material. The shell carries a keel and reinforcing ribs. Depending on the mode of filling, the container may include stand-up supports carried by one of the end covers for vertical support of the container. A combination flood and check valve and a combination vent and check valve provide for connection to an umbilical cord. Thus, sea water may enter the flood valve to fill the container such that the container sinks. A corrosive member holds the valves open for a predetermined time until the members have eroded, thereby closing the valves. The valves now serve as check valves. As the vessel continues to sink, the pressure differential between outside and inside opens the check valves, thus equalizing the pressure in the drum. (Sinha - OEIS)
W74-02040

RADIONUCLIDES IN ECOSYSTEMS.
Available from NTIS, Springfield, Va., as CONF-710501; $27.20 (2 vol. set) in paper copy, $1.45 in microfiche. Proceedings of the Third National Symposium on Radioecology, May 10-12, 1971. Oak Ridge Tennessee Report CONF-710501, (1971). 1,250 p.

Descriptors: *Radioecology, *Research and development, *Conferences, *Thermal pollution, Nuclear powerplants, *Path of pollutants, Environmental effects, Water pollution effects.

Since the 1967 Radioecology Symposium in Ann Arbor, Michigan, the alteration of thermal regimes of aquatic habitats has become an important issue; consequently, a discussion of thermal amendments to aquatic ecosystems is considered an integral part of this symposium. The mission-related research reported here depends on fundamental research, but radioecology also continues to contribute to understanding of basic environmental processes. Participation was encouraged by scientists and engineers who had contributions about assessment of nuclear energy technology applications to human welfare. (See W74-02047 thru W74-02050) (Bopp-ORNL)
W74-02046

PHYSICAL AND BIOLOGICAL DISPERSION OF THE HYPOLIMNETIC PHOSPHORUS OF A BOG LAKE SYSTEM,
Michigan Univ., Ann Arbor. School of Natural Resources.
F. F. Hooper, and D. G. Imes.
In: Radionuclides in Ecosystems, Proceedings of 3rd National Symposium on Radioecology, May 10-12, 1971, Oak Ridge, Tennessee, p 401-409. (1971) 7 fig, 11 ref. (CONF-710501).

Descriptors: *Cycling nutrients, *Phosphorus, *Radioecology, *Lakes, *Hypolimnion, Dissolved oxygen, Hydrogen ion concentration, Mixolimnion, Turbulence, Biological properties, Phosphorus radioisotopes, *Michigan, *Bogs, Tracers, Fluorescent dye.

Estimates of the quantity of P carried vertically by way of circulation in a small Michigan bog lake indicate that this is more important (up to 136 g in a 2- to 3-day period) than biological transport. A second source is P additions from bog mat that occurs at irregular intervals (when the mat is flooded by rain, and there is a flow of interstitial water from the mat into the lake). The lack of littoral sediments as a source for renewal of P gives bog systems low predictability as regards their nutrient supply and makes such systems highly dependent on the vertical intrusion described above. In this study, bottom water was labeled by rhodamine and P32 in the form of orthophosphate. (See also W74-02046) (Bopp-ORNL)
W74-02047

STABLE MANGANESE AND MANGANESE-54 DISTRIBUTIONS IN THE PHYSICAL AND BIOLOGICAL COMPONENTS OF THE HUDSON RIVER ESTUARY,
New York Univ. Medical Center, N.Y.
J. W. Lentsch, T. J. Kneip, M. E. Wrenn, G. P. Howells, and M. Eisenbud.
In: Radionuclides in Ecosystems, Proceedings of 3rd National Symposium on Radioecology, May 10-12, 1971. Oak Ridge, Tennessee, p 752-768. (1971) 17 fig, 6 tab, 22 ref. (CONF-710501).

Descriptors: *Manganese, *Estuarine environment, Aquatic life, *Absorption, *Hudson River, *Estuaries, Fish physiology, Nuclear wastes, Effluents, *Path of pollutants, Aquatic plants, Fish, Nuclear powerplants, Food chains, Public health, Radioecology, Monitoring, On-site investigations.

Samples were taken from a 30-mile sector during 1969 and 1970. Manganese-54 has been introduced into this section of the Hudson primarily in operational waste from the Indian Point unit 1 reactor. The manganese content of several species of rooted aquatic plants was proportional to the dissolved manganese concentration in water. However, several species of fish maintained relatively constant manganese levels, regardless of variable concentrations of manganese in water. Manganese dissolved in water appears to be more biologically available than sedimentary deposits of manganese, as indicated by the specific activities of Mn54 in water, bottom sediment, and biota. Manganese was leached from bottom sediments by seawater intrusion into freshwater regions of the estuary. Supplementary data on salinity, freshwater discharge, suspended sediment load, water temperature, pH, and dissolved oxygen are included to allow generalization of observed phenomena to other similar estuaries. (Bopp-ORNL)
W74-02048

ACCUMULATION OF SOLUBLE AND PARTICULATE RADIONUCLIDES BY ESTUARINE FISH,
National Marine Fisheries Service, Beaufort, N.C.
D. E. Hoss, and J. P. Baptist.
In: Radionuclides in Ecosystems, Proceedings of 3rd National Symposium on Radioecology, May 10-12, 1971. Oak Ridge, Tennessee, p 776-782. (1971) 5 fig, 5 tab, 17 ref. (CONF-710501).

Descriptors: *Nuclear wastes, *Zinc radioisotopes, *Marine fish, *Absorption, Path of pollutants, Fish physiology, Fish diets, Food chains, Public health, Water pollution effects.

Uptake was studied of Zn65 (soluble in seawater) and Ce144 and Cr51 (particulate in seawater) by estuarine fish, mummichog, flounder, Atlantic croaker, and menhaden. Comparisons were made between (1) accumulation of Zn65 and Ce144 from food and from water, and (2) accumulation of Zn65 and Cr51 in the presence and absence of a sediment substrate. The presence of a sediment substrate reduced the accumulation of both Zn65 and Cr51 by Atlantic croaker. Of the tissues analyzed, croaker muscle accumulated the least amount of both isotopes. Higher levels of Zn65 were accumulated by mummichog from food than from water. In contrast neither mummichog nor flounder accumulated appreciable amounts of Ce144 from food. Accumulation of Ce144 in the gastrointestinal tract of menhaden was attributed mainly to swallowed seawater. (See also W74-02046) (Bopp-ORNL).
W74-02049

RESPONSE OF BLUE-GREEN ALGAE TO TECHNETIUM,
Texas Univ., Port Arkansas. Inst. of Marine Science.
For primary bibliographic entry see Field 05C.
W74-02050

CONTRIBUTION TO THE STUDY OF THE MIGRATION OF RUTHENIUM-106 IN SOILS,
Commissariat a l'Energie Atomique, Cadarache (France). Centre d'Etudes Nucleaires.
J.-P. Amy.
Available from NTIS, Springfield, Va., as RFP-TRANS-140; $5.45 per copy, $1.45 per microfiche. CEA Report R-4168, Feb. 1971. 60 p, 22 fig, 24 tab, 39 ref. (Translation of a thesis).

Descriptors: *Radioactivity, *Soil contamination, Movement, Pollutants, *Deposition (Sediments), *Path of pollutants, Water pollution, Water pollution sources, Agriculture, Irrigation, Irrigation water, Food chains, Public health.
Identifiers: *Ruthenium, *France (Rhone River).

These investigations and results showed it is possible to determine from percolation and agitation tests the mobility of ruthenium-106 in soils after possible contamination of a site. We can then define the characteristics of the soils and the ruthenium-106 solutions which would favor an accumulation of radioactivity at the surface of the profile, which in certain cases of heavy pollution would cause a real danger of contamination of the arable soil layer. On the other hand, the mobility of ruthenium-106 will preclude its accumulation at a precise point in the environment in certain other conditions. This maximum mobility is obtained when the radionuclide is found in the form of anionic complexes in very permeable acidic soils of sandy texture and high content of organic matter; in contrast, it is minimum for cationic complexes percolating in calcareous soils with little filtering capability, clay texture and rich content of organic matter. In comparison to the artificial radionuclides produced by the nuclear industry, ruthenium-106 poses no problem concerning pollution of the environment; in fact its dispersion in the surroundings and its short half life constitute two favorable radioecologic factors. (Houser-ORNL)
W74-02051

BIOLOGICAL AND CHEMICAL STUDY OF VIRGINIA'S ESTUARIES,
Virginia Electric and Power Co., Richmond.
M. L. Brehmer.
Va Polytech Inst State Univ Water Resour Res Cent Bull. 45 p, 1-69, 1972. Illus.

Identifiers: Biological studies, Chemical studies, *Chlorophyll, *Estuaries, *Nitrogen, *Phosphorous, *Virginia.

Stations were established at the 20, 15, 10, 5, and < 5% isohalines as measured at the 3 m depth with a portable salinometer in the James, York, and Rappahannock estuaries, Virginia. Cruises were made monthly over a 2 1/2-yr period and water samples were collected from each station for physical, chemical, and biological analyses. Total N in the water column seldom exceeded 200 micrograms-at/l in the winter and spring and 50 micrograms-at/l in the summer and fall. Very little variation was noted within stations between years in the York and Rappahannock, but the James was less uniform. The chemical form of the N present was also more variable. Total P levels in the estuaries were usually less than 4 microgram-at/l with an average of less than 2 microgram-at/l. Particulate P was usually the dominant form at the transition zone between salt and freshwater; whereas, especially in the summer and fall, soluble P was the dominant form near the mouths of the system. Refluxing of regenerated P from the lower Bay on or from near-shore oceanic waters is suggested. Chlorophyll a levels in the water seldom exceeded 10 microgram-at/l. Values were usually the highest in the York system and lowest in the Rappahannock.--Copyright 1973, Biological Abstracts, Inc.
W74-02052

THE STATUS OF THE RADIOACTIVE WASTE DISPOSAL PROBLEM,
B. S. Kolychev, V. V. Kulichenko, and F. V. Rauzen.
Available from Plenum Pub. Corp., 227 W 17th, N.Y., N.Y. 10011; $15.00 per article. Soviet Atomic Energy Vol 33, No 3, September 1972. p 837-841, 9 ref.

Descriptors: *Nuclear powerplants, *Radioactivity, *Effluents, *Radioactive waste disposal, Waste treatment, Oceans, Seawater, Water pollution, Water pollution sources, Food chains, Public health, Hydrogen radioisotopes, Iodine.
Identifiers: *Tritium, USSR.

Reports on the concern of international authors in the field of radioactive waste disposal. The various technologies and methods of treatment, storage, and disposal of wastes in the form of gases, liquids, and solids are described. Of special interest are methods to control tritium and iodine. Noteworthy is the disposal of radioactive wastes in seas and oceans. (Houser-ORNL)
W74-02054

CESIUM DISTRIBUTION IN THE SURFACE LAYER OF THE PACIFIC OCEAN,
O. S. Zudin, B. A. Nelepo, A. N. Spiring, and A. G. Trusov.
Available from Plenum Pub. Corp., 227W 17th St., N.Y., N.Y.: $15.00 per article. Soviet Atomic Energy, Vol 32, No 4, April 1972. p 402-405, 5 fig, 13 ref.

Descriptors: *Nuclear explosions, *Fallout, *Atlantic Ocean, *Pacific Ocean, Measurement, *Assay, *Cesium, Strontium, Sampling, Analytical techniques, Distribution, Surface waters, Water pollution, Water pollution sources, Public health.

Significant aspects of testing of thermonuclear weapons are discussed. These include the history of testing, monitoring for strontium and cesium, difficulties experienced in analysis of samples, and subsequent development of improved methods of analysis and measurement. The surveillance program was initiated in the waters of the Pacific Ocean and subsequently checked by a similar program in the Atlantic Ocean. (Houser-ORNL)
W74-02055

RADIOACTIVITY MEASUREMENTS AT TARAPUR NUCLEAR POWER STATION ENVIRONMENT,
I. S. Bhat, A. A. Khan, and S. Chandramouli.
In: Proceedings of National Symposium on Radiation Physics; Bombay, India, Bhabha Atomic Research Center, Nov. 24, 1970. (CONF-701138), p 493-505, (1971) 9 tab, 3 ref.

Descriptors: *Environment, *Radioactivity, *Nuclear powerplants, Surveys, Monitoring, Effluents, Air pollution, Water pollution, Water pollution sources, Soil contamination, Sampling, Analytical techniques, Assay, Sea water, Air, Soil environment, Regulation, Public health.
Identifiers: *India, Maximum permissible concentration.

The Environmental Survey Laboratory at Tarapur has carried out four years of preoperational investigations on environmental radioactivity at the Tarapur site. In February 1969 the power reactors were put into operation and the station has been releasing low levels of radioactive liquid and gaseous effluents to the environment. The laboratory has been monitoring the increase in the radioactivity of the environment due to these discharges. The levels of radioactivation products and fission products in samples collected from land, air, and sea in the Tarapur environment and their comparison with maximum permissible levels are presented. The conclusions were that up to the time reported, the contamination of the environment is within the safe limits. The contamination on land due to plant releases is not detectable beyond 5 km from site. The contamination on sea is traceable up to 16 km on both sides of the power station along the coast. This is due to the oscillating movement of the coastal waters receiving the radioactive wastes. The contamination of the sea food, even though detectable, is quite neglible near the site where considerable fishing activity is present. (Houser-ORNL)
W74-02056

DISTRIBUTION OF RA-226 IN SOIL AND WATER,
Bahaba Atomic Research Centre, Bombay (India). Health Physics Div.
S. R. Rao, M. D. Borkar, and S. M. Shah.
In: Proceedings of National Symposium on Radiation Physics; Bombay, India, Bhabha Atomic Research Centre, Nov 24, 1970. (CONF-701138), p 507-512, (1971) 4 tab, 10 ref.

Descriptors: *Environment, *Radioactivity, *Human population, Nuclear powerplants, *Nuclear wastes, Air pollution, Water pollution, Water pollution sources, Soil contamination, Plant populations, Absorption, Food chains, Public health, Radium radioisotopes, Cesium, Strontium.
Identifiers: *India.

The radioactivity of the human environment has become a matter of concern in view of increasing utilization of radioactive materials by man. Interest has recently been aroused on the significance of manmade activity such as Cs-137 in the human food chain but knowledge of the natural radioactivity which forms the important component of environmental radioactivity is insufficient. Man is most likely in equilibrium with some of the naturally occurring radionuclides whereas this is not true of the artificially produced radionuclides. Ra-226 in the environment is probably close to equilibrium with human beings and knowledge of the Ra-226 content of the biosphere can lead to an understanding of environmental alpha activity. Soil and water are the important matrices through which the radioactivity is transferred to plants and animals which have direct bearing on the human food chain. Soil and water samples were collected from different locations and analyzed for Ra-226 content, which forms a significant part of the environmental alpha activity. The results obtained for various locations are compared and discussed. (Houser-ORNL)
W74-02057

RADIORUTHENIUM IN AQUATIC ENVIRONMENT OF TROMBAY,
Bahaba Atomic Research Centre, Bombay (India). Health Physics Div.
N. N. Dey, and K. C. Pillai.
In: Proceedings of National Symposium on Radiation Physics, Bombay, India, Bhabha Atomic Research Centre, Nov 24, 1970. (CONF-701138), p 541-553, (1971). 3 fig, 6 tab, 8 ref.

Descriptors: *Monitoring, *Environment, Nuclear powerplants, Effluents, Assay, Measurements, Wells, Strontium, Cesium, Seawater, Sediments, Silts, Benthic fauna, Benthic flora, Seasonal.
Identifiers: *Fuel reprocessing plant, *India (Trombay Bay), *Radioruthenium.

Subsequent to the appearance of radioactivity above background levels in some wells located near the fuel reprocessing plant at Trombay, detailed studies were undertaken to identify and measure the concentration of radionuclides in the well waters. The measurement of total beta, radioruthenium, Sr-90 and Cs-137 concentrations indicated that radioruthenium is the most predominant radionuclide in well waters. The nature of radioruthenium in well waters was investigated. Measurements made during the last 30 months showed seasonal variations in the activity levels. Radioruthenium measurements in seawater, silt, and bottom sediments in the Bombay Harbor Bay indicated low levels in seawater and high concentration in sediments. The radioruthenium in sediments was limited to the discharge locale. Levels were low compared to Cs-137. Some benthic organisms collected in the bay from areas close to the effluent discharge locations showed high concentration factors for radioruthenium. (Houser-ORNL)
W74-02058

HISTOGENESIS AND FUNCTIONING OF THE HYPOPHYSIS AND THYROID GLAND IN THE LARVAE OF ATLANTIC SALMON EXPOSED TO IONIZING RADIATION,
Polyarnyi Nauchno-Issledovatelskii i Proektnyi Institut Morskogo Rybnogo Khozyaistva i Okeanografii, Murmansk (USSR).
For primary bibliographic entry see Field 05C.
W74-02064

CHANGE IN PERIPHERAL BLOOD IN THE EMBRYOS AND LARVAE OF ATLANTIC SALMON UNDER THE INFLUENCE OF RADIOACTIVE CONTAMINATION OF THE WATER AND X-RAYS,
Polyarnyi Nauchno-Issledovatelskii i Proektnyi Institut Morskogo Rybnogo Khozyaistva i Okeanografii, Murmansk (USSR).
For primary bibliographic entry see Field 05C.
W74-02066

POLYCHLORINATED BIPHENYL RESIDUES IN HUMAN PLASMA EXPOSE A MAJOR URBAN POLLUTION PROBLEM,
National Environmental Research Center, Research Triangle Park, N.C.
J. Finklea, L. E. Priester, J. P. Creason, T. Hauser, and T. Hinners.
Am J Public Health. Vol 62, No 5, p 645-651. 1972.
Identifiers: DDT, Dieldrin, Insecticides, Plasma, Pollution, *Urbanization, *Polychlorinated biphenyls, *Pesticide residues.

Polychlorinated biphenyl (PCB) residues and chlorinated hydrocarbon pesticide residues were assayed in 723 plasma samples collected from healthy volunteers from a single southeastern county (USA) who were not occupationally exposed to pesticides. As expected, pp'DDT and DDE residues were almost universal. Residues of DDD (84%) and dieldrin (63%) were common. PCB residues (up to 29 ppb) were found in 43%. Significant age effects, not always linear, were observed for all residues except dieldrin and PCB. Ethnic differences were marked for every residue and ethnic-residence interactions were significant for all except dieldrin. Independent residential effects were observed for all except DDE and dieldrin. Six differences were noted only for pp'DDT and DDE. PCB residues were more frequent and higher in whites and urban residents. Residues were rare (4.1%) in rural blacks. Likely urban exposure routes of PCB include polluted air and contaminated water. Similar occult pollution problems are discussed.--Copyright 1973, Biological Abstracts, Inc.
W74-02078

THE NEED FOR INTENSIFICATION IN ANIMAL PRODUCTION AND THE CONSEQUENT POLLUTION PROBLEM,
B.O.C.M. Silcock Ltd., Basingstoke (England).
P. N. Wilson.
J Sci Food Agric. Vol 23, No 12, p 1393-1398. 1972.
Identifiers: Animal, Beef, Lamb, Pollution, Poultry, *Livestock production, *Farm wastes.

The factors affecting the progress towards intensive livestock production are reviewed with particular reference to milk, beef, lamb, pork, bacon, poultry, meat and egg production. The future trends for the further development of intensive production in each class of livestock are considered and the genetic, managerial and economic constraints are briefly discussed. The different systems of management and housing of the various livestock classes are reviewed and the relevance of each system to the production of effluent is described. The reasons for the trends towards greater control of the animals' environmenta are listed. Finally, the concept of 'stocking density' is considered in respect to the problem of pollution in intensive animal production systems and the possible implications of removing all forms of 'animal pollution' are placed within the context of the other requirements for food production involving domesticated animals.--Copyright 1973,Biological Abstracts, Inc.
W74-02092

CONTRIBUTION TO MINERAL NUTRITION OF CATTLE FROM DRINKING WATER,
For primary bibliographic entry see Field 05A.
W74-02103

CONTRIBUTION TO THE LIMNOLOGY OF HIGH MOUNTAIN LAKES IN CENTRAL AMERICA, (IN GERMAN),
Vienna Univ. (Austria).
For primary bibliographic entry see Field 02H.
W74-02107

MUNCIE INDIANA'S 'TOTAL' LOCAL WATER QUALITY PROGRAM,
Muncie Sanitary District, Ind. Water Quality Div.
J. M. Craddock.
Water and Sewage Works, Vol 120, No 6, p 74-81, June 1973. 5 fig, 6 tab.

Descriptors: *Water pollution control, *Water pollution sources, *Pollution (Stream), Municipal wastes, Industrial wastes, Combined sewers, Outfall sewers, *Indiana, Water quality, Pollutant inditification.
Identifiers: *Muncie (Indiana).

The City of Muncie, Indiana has started a comprehensive program to control water pollution. Three major parts of the program are: (1) the control and prevention of stream pollution within the boundaries of the Muncie Sanitary District, (2) the monitoring of industrial and commerical wastes, and (3) the testing of treatment plant operation. Stream pollution is caused, in part, by the outflows from over 100 sources of raw sewage, phosphates, detergents, oil, heavy metals and other pollutants. Fecal coliform counts in one river have gone as high as 24 million per 100 ml, compared to the limit of 400 per 100 ml for safe swimming. Seven permanent, automatic sampling stations have been established on the area's major waterways. Tables which summarize the data obtained are presented. In early 1973, a total of 827 tests were being run in an average week, testing 21 parameters. Nine additional parameters are being considered for testing in 1973. Industrial and commercial wastes are monitored to determine the types of wastes which will require treatment and to require pretreatment of toxic wastes. Treatment plant operation is tested to keep a careful control on operations. Removal rates range from 99.999 percent for total and fecal bacteria to -10 percent for nickel. (Poertner)
W74-02132

GEOLOGY OF MOUNTRAIL COUNTY, NORTH DAKOTA,
Geological Survey, Grand Forks, N. Dak.
For primary bibliographic entry see Field 02F.
W74-02145

NITROGEN TRANSFORMATIONS DURING SUBSURFACE DISPOSAL OF SEPTIC TANK EFFLUENTS IN SANDS: I. SOIL TRANSFORMATIONS,
Wisconsin Univ., Madison. Dept. of Soil Science.
W. G. Walker, J. Bouma, D. R. Keeney, and F. R. Magdoff.
Journal of Environmental Quality, Vol 2, No 4, p 475-480, October-December 1973. 7 fig, 4 tab, 21 ref.

Descriptors: *Soil disposal fields, *Nitrogen, *Path of pollutants, *Biodegradation, Nitrification, Septic tanks, Hydraulic conductivity, Unsaturated flow.
Identifiers: Soil crusting.

Soil physical and chemical studies of five subsurface septic tank seepage beds were conducted to determine the biochemical transformations of N and thereby its potential for groundwater pollution. Effluent was ponded in all the seepage beds examined due to the presence of an impeding layer, a 'crust', at the boundary between the gravel bed and adjacent soil. The crust reduced infiltration rates approximately from 500 to 8 cm/day. Soil atmospheric composition 5 cm below the crust averaged 19.6% 02 and 0.66% CO2. Nitrogen in the septic tank effluent occurred as NH4-N (80%) and organic N (20%) with virtually no NO3-N. Organic-N was largely concentrated in the crust zone. Nitrification of NH4-N to NO3-N was essentially complete and commenced in the unsaturated subcrust soil within about 2 cm of the crust. Nitrification did not occur and NH4-N was absorbed by the soil below a seepage bed that was submerged in the groundwater. (See also W74-02148) (Knapp-USGS)
W74-02147

NITROGEN TRANSFORMATIONS DURING SUBSURFACE DISPOSAL OF SEPTIC TANK EFFLUENT IN SANDS: II. GROUND WATER QUALITY,
Wisconsin Univ., Madison. Dept. of Soil Science.
W. G. Walker, J. Bouma, D. R. Keeney, and P. G. Olcott.
Journal of Environmental Quality, Vol 2, No 4, p 521-525, October-December 1973. 4 fig, 1 tab, 12 ref.

Descriptors: *Path of pollutants, *Soil disposal fields, *Nitrogen, *Biodegradation, *Groundwater, Soil water, Water pollution sources, Nitrates.

Groundwater observation wells were installed in the immediate vicinity of four septic tank effluent soil disposal systems. Potentiometric maps were constructed from measurements of the ground-

water level at each site to establish the direction of movement. Groundwater samples were pumped from each well to establish patterns of N enrichment in the groundwater around the seepage beds and to evaluate the performance of these disposal systems in sands in terms of N removal. Soil disposal systems in sands added significant quantities of nitrate formed by nitrification of NH4, the dominant form of N in the effluent, to underlying groundwater. In sands, the only active mechanism of lowering the NO3-N content is by dilution with uncontaminated groundwater. Relatively large areas of 0.2 ha downgradient were needed before concentrations in the top layer of the groundwater were lower than 10 mg/liter. The average N-input per person was 8 kg per year. Essentially complete nitrification in the soil results in addition of approximately 33 kg NO3-N to the groundwater per year for an average family of four. (See also W74-02147) (Knapp-USGS)
W74-02148

MOVEMENT OF TOXAPHENE AND FLUOMETURON THROUGH DUNBAR SOIL TO UNDERLYING GROUND WATER,
Clemson Univ., S.C.
K. S. LaFleur, G. A. Wojeck, and W. R. McCaskill.
Journal of Environmental Quality, Vol 2, No 4, p 515-518, October-December 1973. 3 fig, 5 tab, 27 ref.

Descriptors: *Path of pollutants, *Pesticide residues, *Pesticide kinetics, Chlorinated hydrocarbon pesticides.
Identifiers: *Toxaphene, *Fluometuron.

One hundred kilograms per hectare of toxaphene (octachlorocamphene) and 40 kg/ha of fluometuron (3- (m-trifluoromethylphenyl-1, 1-dimethylures) were applied to Dumbar topsoil in a fieldplot in the South Carolina Coastal Plain. Loss of both pesticides from the topsoil and accumulation in underlying groundwater were monitored for 1 year. Toxaphene loss from topsoil occurred in two stages. The second (major) stage was crudely linear on a log residue vs. log time plot. Half-residence time in the topsoil was about 100 days. Fluometuron loss from topsoil occurred in one continuous episode that was crudely linear on a log residue vs. linear time plot. Half-residence time in the topsoil was about 120 days. Toxaphene and fluometuron were found in underlying groundwater within 2 months after they were applied to the topsoil. Both pesticides persisted in groundwater during the entire year. Overall, concentrations gradually decreased with time. (Knapp-USGS)
W74-02149

NITRATE IN SURFACE AND SUBSURFACE FLOW FROM A SMALL AGRICULTURAL WATERSHED,
Agricultural Research Service, Watkinsville, Ga.
W. A. Jackson, L. E. Asmussen, E. W. Houser, and A. W. White.
Journal of Environmental Quality, Vol 2, No 4, p 480-482, October-December 1973. 1 fig, 2 tab, 8 ref.

Descriptors: *Nitrates, *Path of pollutants, *Fertilizers, *Georgia, Corn (field), Water quality, Nutrients, Subsurface drainage, *Agricultural watersheds.

A small agricultural watershed on Cowarts loamy sand in the Georgia Coastal Plains was planted in corn each year from 1969 to 1971. Surface and subsurface water samples were collected during each natural rainfall runoff event and NO3-N was determined. The initial weighted average NO3-N concentration was 5 ppm in the subsurface runoff for 3 months before the first planting. The average was 7 ppm in 1969, 10 ppm in 1970, and 9 ppm in 1971. The concentration of NO3-N in most of the surface runoff for 3 years was less than 1 ppm; the maximum was 3 ppm. Subsurface flow accounted for 80% of the total runoff during the study period. Thus, greater amounts of NO3-N were discharged in subsurface flow than in surface flow from this watershed. (Knapp-USGS)
W74-02150

5C. Effects of Pollution

BIOLOGICAL CONTROL OF WATER WEEDS WITH PLANT PATHOGENS,
Florida Univ., Gainesville. Dept. of Plant Pathology.
T. E. Freeman, R. Charudattan, and F. W. Zettler.
Available National Technical Information Service as PB-225 473/8 $3.50 in paper copy; $1.45 in microfiche. Florida Water Resources Research Center, Gainesville, Publication No. 23, August 1973 52 p, 4 fig, 9 pl, 3 tab, 29 ref. OWRR B-011-FLA (10), 14-31-0001-3268.

Descriptors: *Aquatic weed control, Plant pathology, Blights, Spots, Viruses, Biocontrol, Aquatic weeds, Surveys, *Plant diseases, *Water hyacinth, *Alligatorweed, Water pollution effects.
Identifiers: *Hydrilla, *Eurasian watermilfoil.

A search was made for diseases of water weeds to use as biocontrol. Emphasis was placed on finding diseases of waterhyacinth (Eichhornia crassipes), alligatorweed (Alternathera philoxeroides), hydrilla (Hydrilla verticillata), and Eurasian watermilfoil (Myriophyllum spicatum). Surveys included all of Florida and parts of Alabama, Maryland, Louisiana, Georgia, South Carolina, the Chesapeake Bay and the Tennessee Valley areas. Also Puerto Rico, Guatemala, El Salvador, Panama, Colombia, Mexico, Barbados, Jamaica, Trinidad, and in the states of Mysore, Kerala, Tamilnadu, Kashmir, Uttar Pradesh, Rajasthan, Orissa and West Bengal in India. Foremost discoveries were: (1) A blight of waterhyacinth incited by Rhizoctonia solani in India, Panama, and Puerto Rico, (2) A zonate leaf spot of waterhyacinth incited by Cephalosporium zonatum, found in Florida and Louisiana and also in El Salvador, Puerto Rico and India, (3) A virus-induced stunting disease of alligatorweed from Florida, (4) A Pythium and Sclerotium incited blight of hydrilla and a Penicillium sp. that produces matabolites lysogenic to hydrilla, first ever recorded on hydrilla and (5) A root and crown disease of waterhyacinth of unknown cause in Florida.
W74-01653

RELATIVE LEACHING RATES OF COMMON NITROGEN CARRIERS FROM SANDY SOILS IN RELATION TO LAKE EUTROPHICATION,
Rollins Coll., Winter Park, Fla. Dept. of Biology.
For primary bibliographic entry see Field 05B.
W74-01654

TOXICITY OF POWER PLANT CHEMICALS TO AQUATIC LIFE.
Battelle-Pacific Northwest Labs., Richland Wash.

Available from NTIS, Springfield, Va., as WASH-1249; $7.60 in paper copy, $1.45 in microfiche. Report WASH-1249, June 1973. 236 p, 19 tab, 730 ref. Compiled by C. D. Becker and T. O. Thatcher.

Descriptors: *Chemicals, *Reviews, *Toxicity, *Aquatic life, *Bibliographies, *Nuclear powerplants, Estuarine evironment, Effluents, Waste water (Pollution), Chemical reactions, Corrosion, Inhibition, Cooling towers, Path of pollutants, Water pollution effects, Aquatic habitats.

This report was prepared for the Atomic Energy Commission to aid the evaluations required by the National Environmental Policy Act of 1969. Data are summarized in tabular form on effects of chemicals (including those having potential uses in nuclear power plant operations) on organisms in freshwater, estuarine, or marine environments. The categories included are: acids; acrolein; arsenates and arsenites; ammonia, amines, and related compounds; boron; carbonates; chlorine and bromine; chlorinated or phenylated phenols; chromates; cyanurates and cyanides; hydrazine compounds; hydroxides; metals and their salts; nitrates and nitrites; potassium compounds; phosphates; silicates; sulfates, sulfides, and fluorides. References are cited, including sources for additional information. The uses of the chemicals, their reactions, and the reaction products that may occur in plant effluents are discussed briefly for each category. (Bopp-ORNL)
W74-01732

SPARTINA ALTERNIFLORA (TALL) PRODUCTIVITY IN A POLLUTED NEW JERSEY ESTUARY,
Lehigh Univ., Bethlehem, Pa. Dept. of Biology.
G. T. Potera, and E. E. MacNamara.
Bull N J Acad Sci, Vol 17, No 1, p 13-14, 1972, Illus.
Identifiers: *Estuary, Islands, *New Jersey (Long Island), Pollution, Seasonal, Spartina-alterniflora, *Cord grass, *Primary productivity.

Net primary productivity for cord grass, S. alterniflora (tall), based on several 1 m2 harvest sites from a polluted northern New Jersey estuary is presented. Average productivity for the New Jersey site was more than 40% greater than reported cord grass productivity at Hempstead, Long Island. The significant increase in productivity was attributed to a slightly longer growing season.--Copyright 1973, Biological Abstracts, Inc.
W74-01738

TOXICITY OF TWENTY-THREE INSECTICIDES TO A TUBIFICID WORM BRANCHIURA SOWERBYI FROM THE MISSISSIPPI DELTA,
Mississippi State Univ., State College. Dept. of Zoology.
S. M. Z. Naqvi.
J Econ Entomol, Vol 66, No 1, p 70-74, 1973, Illus.
Identifiers: Branchiura-sowerbyi, Gas chromatography, Delta, *Insecticides, *Mississippi delta, Morphological studies, Mortality, Procambarus-clarkii, Resistance, *Toxicity, *Tubificid worm.

Tubificid worms, B. sowerbyi Beddard, from the Mississippi delta region were bioassayed in 23 commercial insecticides (chlorinated hydrocarbons, organophosphates, and carbamates). Maximum concentrations of 15 insecticides (0.5-4.0 ppm at 21 deg C) failed to cause mortality in 72-hr exposure, but they produced reversible morphological changes of the worms. Variations in morphological changes occurred in response to an insecticide type rather than to concentration, and they may possibly be used for monitoring purposes. Insecticide toxicity was influenced also by temperature changes. The worms were extremely susceptible to dissolve chlorine in tap water (6-10 ppm) which caused complete disintegration of the body, leaving a residual black ring at the site of death. Insecticide-treated worms of known weight and treatment time were fed to crayfish, Procambarus clarkii Girard, and their mortality was recorded. Insecticide toxicity to crayfish was inversely proportional to treatment time of the worms prior to feeding, but was directly proportional to insecticide concentration. Crayfish showed less ill effects when they ate carbamate-treated worms, especially if the worms were exposed to the insecticide for a long time. Gas-chromatographic analyses of field-collected worms exhibited a high concentration of organochlorine compounds, especially DDT, DDD and DDE. Trace amounts of toxaphene also were detected. Possible mechanisms of insecticide resistance in tubificids are discussed, including the effects of mud in reducing the bioactivity of various insecticides.--Copyright 1973, Biological Abstracts, Inc.

W74-01740

DYNAMIC STATUS OF PRIMARY PRODUCTION IN LAKE YUNOKO, A SMALL EUTROPHIC SUBALPINE LAKE IN CENTRAL JAPAN,
Tokyo Univ. (Japan). Botanical Inst.
Y. Yamaguchi, and S-E. Ichimura.
Bot Mag (Tokyo), Vol 85, No 999, p 157-176, 1972, Illus.
Identifiers: Carbon, Chlorophyll, *Eutrophic lakes, *Japan (Lake Yunoko), Lakes, Microbial, Nitrogen, Phosphorus, Photosynthesis, *Phytoplankton, *Primary production, Respiration, Seasonal, Subalpine lakes.

The concentrations of PO4-P and NH3-N were highest in summer. The total amount of chlorophyll a in the entire water column varied from 45 mg/m2 to 405 mg/m2 during the year with the maximum values occurring in late spring and in Dec. These values are very high compared with those reported for other lakes in the same district. The standing crop of phytoplankton as organic C was approximately 50 to 70% of the total particulate organic C in the lake with values as high as 80 to 90% being obtained in the spring and autumn. The rate of photosynthesis under saturated light conditions was 3.7 mgC/mg chl a/hr in the case of phytoplankton of the sun type and 1.2 to 1.6 mgC/mg chl a/hr in those of the shade type. The daily gross primary production in the lake varied from a low of 134 mgC/m2 to a high of 1003 mgC/m2 during the year, the mean value being 372 mgC/m2. The total amount of daily microbial respiration varied from 177 mgC/m2 in winter to 1476 mgC/m2 in summer. Thus, the daily balance of production and consumption of organic matter in the lake itself was concluded to be negative. The main factor contributing to the rectification of this imbalance of material budget seems to be the leaf litter coming from the forest surrounding the lake. Lake Yunoko is a very productive and at the same time, fairly heterotrophic lake.--Copyright 1973, Biological Abstracts, Inc.
W74-01750

PHYTOPLANKTON OF THE UPPER YENISEI BEFORE THE SAYANY RESERVOIR FORMATION, (IN RUSSIAN),
Akademiya Nauk SSSR, Leningrad. Institut Ozerovedeniya.
I. S. Trifonova.
Gidrobiol Zh. Vol 8, No 4, p 5-10, 1972. (English summary)
Identifiers: Biomass, Cyanophyceae, *Diatoms, *Phytoplankton, Protococcaceae, Reservoirs, *USSR (Upper Yenisei), Volvocaceae.

Phytoplankton in the investigated section of the Yenisei (USSR) is qualitatively homogeneous. Diatoms amount to 60-100% of its total biomass; which varies from 8 to 70 g/m3. In shallow, well heated water bodies of the flood bed, phytoplanton are variable and abundant. The lake forms of Cyanophyceae, Protococcae and Volvocina predominate. Biomass is 2 g/m3 in the dam part of the Krasnoyarsk reservoir. Maximum biomass of phytoplankton is 3 g/m3. In the Sayany reservoir phytoplankton consist of rather variable but quantitatively poor river phytoplankton and abundant phytoplankton of flood bed water bodies. The composition, abundance and distribution of dominating forms are similar to that from the Krasnoyarsk reservoir, but because of the great flow and depth, the roie of Cyanophyceae here is less.--Copyright 1973, Biological Abstracts, Inc.
W74-01757

MICROPHYTOBENTHOS AND OVERGROWING SOME RESERVOIRS IN TURKMENIA, (IN RUSSIAN),
Akademiya Nauk Turkmenskoi SSR, Askhabad. Institut Botaniki.
Kh. Sadykov.
Izv Akad Nauk Turkm SSR Ser Biol Nauk. No 4, p 37-43, 1972. (English summary).
Identifiers: *Benthos, Clayish, *Diatoms, Reservoirs, Sandy, Soils, *USSR (Turkmenia), *Cyanophyta, *Algae.

Algae (217 taxa) were recorded in 4 reservoirs of Turkmenia (USSR). Blue-green algae with a few green algae and diatoms are the principal components of the microphytobenthos of the reservoirs sandy and sandy-clayish soils. Microphytobenthos and algal blooms of the investigated reservoirs consist mainly of eurygal and common oligomesohalobic organisms.--Copyright 1973, Biological Abstracts, Inc.
W74-01758

ADAPTATION TO AMMONIA IN SITU BY SUBMERGED MACROPHYTES,
Freiburg Univ. (West Germany). Limnologisches Institut.
J. Schwoerbel, and G. C. Tillmanns.
Arch Hydrobiol Supplement B. Vol 42, No 1, p 139-141, 1972. Illus.
Identifiers: *Ammonia, Callitriche-Hamulata, *Macrophytes, *Nitrates, Nitrogen, Potamogeton-Perfoliatus, Ranunculus-Fluitans, Reductase, Submerged plants.

Fresh Ranunculus fluitans, Potamogeton perfoliatus and Callitriche hamulata, Submerged in water containing KNO3 and (NH4)2PO4 as N sources, absorbed ammonia intensively from the water, but took almost no nitrates over a period of several days. C. hamulata submerged in ammonia-free, nitrate-containing water absorbed no N for the first 7 days. After 14 days, nitrate was absorbed indicating an ammonia adaptation in habitat water is eliminated after 7-14 days in water with nitrates as the only N source. It is assumed that N reductase is inactive in the ammonia absorbing cells of the ammonia adapted plants.--Copyright 1973, Biological Abstracts, Inc.
W74-01759

UPTAKE OF SODIUM, CALCIUM, AND CHLORINE BY COTTON PLANTS DURING IRRIGATION WITH A SOLUTION SIMILAR TO SEA WATER, (IN RUSSIAN),
Agrofizicheskii Nauchno-Issledovatelskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 03C.
W74-01766

THE EFFECTS OF OIL ON THE GILL FILTRATION RATE OF MYA ARENARIA,
Duke Univ., Durham, N. C. Dept. of Zoology.
G. E. Anderson.
Va J Sci. Vol 23, No 2, p 45-47. 1972.
Identifiers: Filtration, *Gill filtration, Mya-Arenaria, *Oil pollution, *Clams (Soft-shell).

The acute effects of oil pollution on the soft-shelled clam, Mya arenaria, were studied by measuring changes in turbidity of graphite-particle suspensions as indices of filtration rates. Filtration rates were measured during 3-hr intervals before and after exposure to either 0.9% oil-water emulsions or to 0.9% extracts of oil in water. A paired observations test indicated significant rate increases in clams exposed to the emulsions, but there were no definite trends in the responses of clams exposed to the oil extract.--Copyright 1973, Biological Abstracts, Inc.
W74-01773

PREDICTION OF COPPER TOXICITY IN RECEIVING WATERS,
Environmental Protection Service, St. John's (Newfoundland).
R. C. H. Wilson.
Identifiers: *Canada (Exploits River), *Copper toxicity, Prediction, *Salmon (Atlantic), Toxicity, Water pollution effects.

The 96-hr LC50 of copper to Atlantic salmon parr in water taken from the Exploits River, Newfoundland, Canada, is about 125 micro gram/liter at a total hardness of 8-10 mg/liter CaCO3 and a total alkalinity of 4 mg/l. However, the addition of spent sulphite liquor from a pulp mill allowed fish to survive more than 180 micro gram/l Cu. Considering the variety of organic compounds which have now been shown to chelate dissolved Cu, it is likely that a simple model for the prediction of Cu toxicity in waters receiving mine effluent will prove impossible.--Copyright 1973, Biological Abstracts, Inc.
W74-01775

EFFECTS OF DISSOLVED OXYGEN ON TWO LIFE STAGES OF THE MUMMICHOG,
National Marine Water Quality Lab., West Kingston, R.I.
R. A. Voyer, and R. J. Hennekley.
Prog Fish-Cult. Vol 34, No 4, p 222-225. 1972, Illus.
Identifiers: *Dissolved oxygen, *Mummichog, *Lethal limit, Water pollution effects, *Toxicity, Mortality.

Adult mummichogs were exposed for 6 hr to a range of dissolved oxygen (DO) levels (0.4-7.2 mg DO/l). Concentrations of DO lethal to 50% of the fish were 0.74-0.89 and averaged 0.80 for 3 tests. Mummichog embryos were incubated at 3 DO concentrations for 27 days. Mortality was maximum at the 14th day of exposure and was inversely related to O2 concentration. After 27 days exposure, 88% of the embryos hatched at 7.5 mg DO/l, 62% at 4.5 mg DO/l and 9% at 2.4 mg DO/l. A 50% hatch theoretically would occur at 3.9 mg DO/l.--Copyright 1973, Biological Abstracts, Inc.
W74-01776

EFFECT OF CERTAIN PHYSIOCOCHEMICAL FACTORS ON THE PLANKTON OF THE NANGAL LAKE,
Punjab Univ., Chandigarh (India). Dept. of Zoology.
K. K. Tandon, and H. Singh.
Proc Indian Acad Sci Sect B. Vol 76, No 1, p 15-25. 1972, Illus.
Identifiers: Dissolved oxygen, *India (Nangal Lake), Lakes, Light, *Physicochemical factors, *Phytoplankton, Seasonality, Temperature, Zooplankton, Hydrogen ion concentration.

Physical factors such as temperature of air and water and penetration of light, and chemical factors like pH, total alkalinity, dissolved oxygen and phosphates were studied for 1 yr in this Indian lake. Maximum and minimum temperatures of air were recorded in June 1969 and Feb. 1969, respectively, and that of water in Sept. 1968 and February 1969. Dissolved oxygen was maximum in May and June 1969 and minimum in Oct. 1968. pH did not show much variation. Penetration of light was maximum in April 1969 and minimum in June 1969. Maximum total alkalinity was observed in Oct. 1968 and minimum in Aug. 1968. Phosphates were absent in Oct. 1968. Maximum abundance of zooplankton generally followed the phytoplankton bloom.--Copyright 1973, Biological Abstracts, Inc.
W74-01778

DISSOLVED POLLUTION PRODUCT GASES IN NATURAL WATERS,
Maine Univ., Walpole. Dept. of Oceanography.
For primary bibliographic entry see Field 05B.
W74-01786

CHEMISTRY AND APPLICATION OF ORGANOPHOSPHORUS COMPOUNDS, PROCEEDINGS OF THIRD CONFERENCE.
For primary bibliographic entry see Field 05B.
W74-01787

METABOLISM OF ORGANOPHOSPHORUS COMPOUNDS IN ANIMALS,
Leningradskii Meditsinskii Institut (I) (USSR).
For primary bibliographic entry see Field 05B.
W74-01790

DERIVATIVES OF PHOSPHACYCLOPENTENE,
Akademiya Nauk SSR, Kazan. Inst. of Organic and Physical Chemistry.
For primary bibliographic entry see Field 05B.
W74-01791

ANTICHOLINESTERASE PROPERTIES OF CERTAIN ORGANOPHOSPHORUS COMPOUNDS,
Akademiya Nauk SSSR, Moscow. Inst. of Heteroorganic Compounds.
For primary bibliographic entry see Field 05B.
W74-01793

CERTAIN PROBLEMS IN THE QUANTITATIVE TOXICOLOGY OF ORGANOPHOSPHORUS COMPOUNDS,
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gigieni i Toksikologii Pestitsidov, Kiev (USSR).
For primary bibliographic entry see Field 05B.
W74-01795

METATHION--A NEW LOW-TOXICITY ORGANOPHOSPHORUS INSECTICIDE,
Vyzkumny Ustav Agrochemickej Technologie, Bratislava (Czechoslovakia).
For primary bibliographic entry see Field 05B.
W74-01796

NUTRIENTS IN NATURAL WATERS.

Wiley-Interscience, Division of John Wiley and Sons, Inc., New York, N.Y. 1972. H. E. Allen and J. R. Kramer, editors. 457 p.

Descriptors: *Nutrients, *Eutrophication, *Cycling nutrients, *Nitrogen, *Phosphorus, *Carbon cycle, Chemical analysis, Simulation analysis, Mathematical models, Bioassay, Marine algae, Oxygen, Lake Erie, Lake Ontario, Lake Huron, Sulfur, Sedimentology, Lake Michigan, Trace elements, Detergents, Fallout, Waste water treatment, Biological treatment, Chemical degradation, Governments, Administration, Adoption of practices, *Nutrient removal.

The latest hypotheses and research on nutrients is presented by experts in the chemical and biological sciences and engineering, giving a broad coverage of all aspects of the chemistry, biochemistry, and geochemistry of nutrients in natural waters and of control policies of the United States and Canada. A broad discussion is featured describing the serious aquatic problems. In addition to chapters on the three principal nutrients, (nitrogen, phoshorus and carbon) including chemical and bioassay analyses, chapters on sediment diagenesis and nutrient regeration in hypolimnetic waters are included. Computer models of nutrient biochemical processes are described. Evidence for the increased rate of nutrient loading is given by geochemical studies of sediments. Atmospheric contributions of chemicals to the aquatic system are discussed with specific reference to Lake Michigan. The testing program to which a new detergent is subjected and the detergent requirements are given. Chapters on biological and physical-chemical waste treatment shed light on the present capabilities for nutrient removal and also indicate future directions for research. (See W74-01799 thru W74-01809) (Jones-Wisconsin)
W74-01798

NITROGEN: SOURCES AND TRANSFORMATIONS IN NATURAL WATERS,
Florida Univ., Gainesville. Dept. of Environmental Engineering.
P. L. Brezonik.
In: 'Nitrients in Natural Waters,' Wiley-Interscience, Division of John Wiley and Sons, Inc., New York, N.Y., 1972, p 1-50. 10 fig, 12 tab, 115 ref. OWRR 16010 DCK.

Descriptors: *Nitrogen, *Nitrogen cycle, Nutrients, Sinks, Waterfowl, Nitrates, Ammonia, Ammonification, Nitrification, Denitrification, Nitrogen fixation, Agriculture, Fertilization, Clear-cutting, Rainfall, Pastures, Phosphorus, Feed lots, Eutrophication, Depth, Estuaries, Wisconsin, Mathematical studies, Land use, Population, Nitrites.
Identifiers: *Nitrogen sources, Nitrogen budget, Trophic state index, Nutrient loading rates.

The chemistry and biochemistry of nutrients in aquatic systems, the quantification of nutrient sources and sinks and the dynamics of nutrient uptake and release are discussed in relation to the nitrogen cycle in natural waters. Concentration and forms of nitrogen in a lake are the product of input rates, inter-conversion reactions within the lake, and the rates of loss from outflow, denitrification and sediment deposition. Nitrogen fixation rates measured with N-15 techniques in lakes and marine waters show high rates correlated with blue-green algal blooms, primarily Anabaena, Gloeotrichia, and Aphanizomenon in lakes, and Trichodesmium in subtropical marine waters. Processes of nitrogen cycling and interchange in sediments are complicated and poorly understood, since there is little information to establish in situ rates and controlling factors. Calculated nitrogen and phosphorus budgets for 55 Florida lakes exhibit significant correlation with their trophic states as measured by a quantitative index. Critical loading rates, above which eutrophication problems may occur, can be estimated by such regression relationships. Measured ammonia turnover times imply a rapid recycling of nitrogen between organic compounds and the ammonia pool. Decomposition of nitrite in soils by reaction with phenolic compounds has been recently reported. (See also W74-01798) (Jones-Wisconsin)
W74-01799

PHOSPHORUS: ANALYSIS OF WATER, BIOMASS, AND SEDIMENT,
McMaster Univ., Hamilton (Ontario). Dept. of Geology.
J. R. Kramer, S. E. Herbes, and H. E. Allen.
In: 'Nutrients in Natural Waters,' Wiley-Interscience, Division of John Wiley and Sons, Inc., New York, N.Y., 1972, p 51-100. 3 fig, 4 tab, 184 ref.

Descriptors: *Phosphorus, *Water analysis, *Biomass, *Sediments, Agricultural runoff, Farm wastes, Limiting factors, Eutrophication, Detergents, Urban runoff, Nutrients, Phytoplankton, Zooplankton, Detritus, Fallout, Analytical techniques, Adsorption, Phosphorus compounds, Phosphates, Minerology, Calcium, Iron, Aluminum.
Identifiers. *Phorphorus sources, *Phosphorus cycle, Organic phosphorus, Orthophosphate.

In reviewing phosphorus as a nutrient, consideration is given to composition of phytoplankton, zooplankton, and detritus in context to the 'limiting' concept, biological utilization of phosphorus, analysis of various forms of the element in solution, and the mineral uptake and release of phosphorus. The 'limiting' nutrient concept is based on a fixed or approximately fixed organism composition. Another approach to organisms composition in context with the limiting nutrient is to ascertain minimum concentration of P/cell, P/cell volume or P/cell weight (interrelated for constant size and density) for growth. All phosphate determination methods commonly used are modifications of the Denige's colorimetric phosphomolybdic acid method. In addition to orthophosphate analysis, there may be need to acid hydrolyze or digest a sample aliquot of either filtered or unfiltered sample to determine the phosphorus fraction of interest. Exchange of phosphorus between sediment and water is perhaps the most important aspect of phosphorus in natural waters. Minimum solution of phosphorus at pH 5 to 7 corresponds closely to minima of solubility and pH of zero point of charge for aluminum-bearing minerals. These may be more significant than iron oxides and hydroxides in adsorption of phosphorus. (See also W74-01798) (Jones-Wisconsin)
W74-01800

THE CARBON CYCLE IN AQUATIC ECOSYSTEMS,
Environmental Protection Agency, Athens, Ga. Southeast Water Lab.
P. C. Kerr, D. L. Brockway, D. L. Paris, and W. M. Sanders, III.
In: 'Nutrients in Natural Waters,' Wiley-Interscience, Division of John Wiley and Sons, Inc., New York, N.Y., 1972, p 101-124. 5 fig, 1 tab, 87 ref.

Descriptors: *Carbon cycle, *Nutrients, *Carbon, Inorganic compounds, Organic compounds, Bacteria, Carbon dioxide, Primary productivity, Cycling nutrients, Oxidation, Metabolism, Respiration, Photosynthesis, Carbonates.
Identifiers: *Carbon sources.

In general, there are four sources of inorganic carbon in aquatic ecosystems: atmosphere, carbonates, allochthonous inorganic carbon, and biological cycling of autochthonous and allocthonous materials. The relative rates at which the various nutrients cycle are the determinants of nutrient regulation of biological activity. Biological nutrient cycling results from the opposite but closely linked activities of autotrophic and heterotrophic organisms. Green plant photosynthesis is generally the major source of organic production, but a few data indicate rather large amounts of bacterial fixation. Organic material secreted by autotrophic organisms, organics secreted and excreted by heterotrophic organisms, and cellular constituents of all organisms at death constitute the carbon and energy source for heterotrophic populations. Allochthonous organic material, particularly deciduous leaves, constitutes a significant proportion of the total energy flow of many aquatic ecosystems. The rate (s) of these changes determine the instataneous availability of specific molecular forms of carbon and thus regulate species selection and growth of those organisms dependent on particular molecular carbon forms. It is necessary to ascertain the rates of nutrient cycling, and the genetic, environmental, and chemical factors affecting that rate, and thus nutrient availability, to comprehend the complexity of aquatic ecosystems. (See also W74-01798) (Jones-Wisconsin)
W74-01801

THE CHEMICAL ANALYSIS OF NUTRIENTS,
Department of the Environment, Ottawa (Ontario). Inland Waters Branch.
P. D. Goulden.
In: 'Nutrients in Natural Waters,' Wiley-Interscience, Division of John Wiley and Sons, Inc., New York, N.Y., 1972, p 125-146. 37 ref.

Descriptors: *Analytical techniques, *Chemical analysis, *Nutrients, Carbon, Nitrogen, Phosphorus, Silica, Trace elements, Sampling, Preservation, Measurement, Data processing, Computers, Spectrophotometry, Fluorescence, X-ray fluorescence, Polarographic analysis, Solvent extraction, Filters, Chemical oxygen demand, Colorimetry, Separation techniques.

Identifiers: Sample pretreatment, Atomic fluorescence, Anodic stripping.

Analytical methods for forms of carbon, nitrogen, phosphorus, silica, and trace metals are described. A technique specifically measuring carbon content is conversion of carbon to carbon dioxide and measuring amount produced. Many methods are available for oxidation of organic carbon and for measurement of carbon dioxide produced. Infra-Red Carbonaceous Analyzers are used to determine total and organic carbon. The nitrogen forms that can be separated analytically are ammonia, nitrite, nitrate, and 'organic nitrogen.' Kjeldahl's classical digestion method for determination of 'organic nitrogen' and ammonia, has been automated in many forms, most commonly used is the 'Technicon' continuous digestor for the reaction with digestion mixtures, and the indophenol blue reaction serving to measure amount of ammonium ion formed. Phosphorus forms, conveniently measured, are: soluble orthophosphate, inorganic phosphate and total phosphorus. Soluble orthophosphate (reactive phosphate) is the phosphate in a filtered sample that reacts in molybdenum blue; silicon occurs as silicic acid and its salts. Silicic acid polymerizes quite readily and probably only short, straight chain polymers are measured by the customary silicomolybdate complex method. Trace metals are analyzed by atomic absorption spectrophotometry, atomic fluorescence, X-ray fluorescence, differential-cathode polarography, cathode-ray polarography, anodic stripping and solvent extraction. Sampling, preservation, pretreatment, and measurement process, and data handling are described. (See also W74-01798) (Jones-Wisconsin)
W74-01802

BIOASSAY ANALYSIS OF NUTRIENT AVAILABILITY,
Wisconsin Univ., Madison. Water Resources Center.
G. P. Fitzgerald.
In: 'Nutrients in Natural Waters,' Wiley-Interscience, Division of John Wiley and Sons, Inc., New York, N.Y., 1972, p 147-169. 3 tab, 20 ref, 1 append.

Descriptors: *Analytical techniques, *Bioassay, *Nutrients, *Limiting factors, Algae, Plant growth, Nitrogen fixation, Eutrophication, Ammonia, Absorption, On-site tests.
Identifiers: Lake Mendota (Wis.).

Growth tests with algae in water samples can determine relative ability of different water samples to support growth, which nutrient may be limiting growth, and how algae will respond to an increase in a nutrient or combination of nutrients. The value of bioassays is the record of responses of algae to growth conditions. To determine the biological availability of algal nutrients in a sample of water and to measure the response to changes in the growth-limiting nutrient, growth attained by selected algae can be measured in spiked and untreated samples, available nitrogen of the sample can be calculated from ammonium-nitrogen absorption rates after incubation with nitrogen-limited algae, available phosphorus of the sample can be calculated from increases in extractable phosphate-phosphorus after incubation with phosphorus-limited algae or increses in rate of acetylene reduction by phosphorus-limited, nitrogen-fixing algae. A summary is given of limnological facts recently corroborated by bioassay analyses. There is an obvious ecological preference for physical harvesting of aquatic weeds that, if killed by chemical treatment, could release some of their nutrients to the lake water in forms available for algal growth. (See also W74-01798) (Jones-Wisconsin).
W74-01803

NUTRIENT SUBMODELS AND SIMULATION MODELS OF PHYTOPLANKTON PRODUCTION IN THE SEA,
Washington Univ., Seattle. Dept. of Oceanography.
J. J. Walsh, and R. C. Dugdale.
In: 'Nutrients in Natural Waters,' Wiley-Interscience, Division of John-Wiley and Sons, Inc., New York, N.Y., 1972, p 171-191. 14 fig, 1 tab, 21 ref.

Descriptors: *Marine algae, *Nutrients, *Model studies, *Simulation analysis, Phytoplankton, Productivity, Sea water, Distribution, Trophic level, Mathematical models, Computers, Upwelling, Outfall sewers, Food chains, Water temperature, Equations, Phosphates, Nitrates, Silicates, Chlorophyll, *California, Fisheries, Ammonia.
Identifiers: *Peru, Los Angeles (Calif.), Herbivorous fish, Marine outfall ecosystems, Plumes.

Simulation models of marine ecosystems consisting of sets of coupled non-linear partial differential equations describing the temporal and spatial distribution of nutrients and phytoplankton are described. Two ecosystems--upwelling and marine outfalls--are modeled. Modern high-speed computers must be used for numerical solution of the equations. Coastal upwelling ecosystems are being unraveled near San Juan, Peru where through a variety of methods including discrete station sampling and an automated system for mapping surface parameters, a picture of the distribution of certain variables was obtained. Plume structures occur in all major upwelling areas, and this environmental heterogeneity may be a key to the evolutionary development of the short, productive diatomaceous phytoplankton-clupeiform fish food chains found in these areas. The first model of the Peru upwelling system is based on a one-dimentional, two-layered series of spatial blocks aligned along the plume axes. For a marine outfall ecosystem, a two-dimensional, one-layered model of the Hyperion outfall at Los Angeles was developed. Transfer of materials in a complex system model is described through a series of submodels such as the terms of the first equation. Successful operation of the system model depends on the soundness of all the submodels. (See also W74-01798) (Jones-Wisconsin)
W74-01804

CHANGES IN C, N, P, AND S IN THE LAST 140 YEARS IN THREE CORES FROM LAKES ONTARIO, ERIE, AND HURON,
Department of the Environment, Burlington (Ontario). Centre for Inland Waters.
A. L. W. Kemp, C. B. J. Gray, and A. Mudrochova.
In: 'Nutrients in Natural Waters,' Wiley-Interscience, Division of John Wiley and Sons, Inc., New York, N.Y., 1972, p 251-279. 8 fig, 4 tab, 40 ref.

Descriptors: *Carbon, *Nitrogen, *Phosphorus, *Sulfur, *Great Lakes, Cores, Lake Ontario, Lake Erie, Lake Huron, Carbonates, Hydrogen ion concentration, Oxidation-reduction potential, Sediments, Sediment-water interfaces, History, Eutrophication, Organic matter, Sedimentation rates, Urbanization.
Identifiers: Organic carbon, Total nitrogen, Total phosphorus, Carbonate-carbon, Total sulfur.

Total organic carbon, carbonate carbon, nitrogen, phosphorus, sulfur, pH, Eh, water content, and sediment texture in the top 50 cm of sediment in a single core from each of Lakes Ontario, Erie, and Huron were investigated to note changes near sediment-water interfaces, to measure the increase in C, N, P, and S loading to sediment in the last 140 years by relating the measurement to a time scale based on estimated sedimentation rates, and to compare cores from regions near industrial and urban sources of input with a core unaffected by urbanization. Cores were taken from near the deepest point in Lake Ontario, in central basin of Lake Erie, and in South Bay, Lake Huron. The maximum organic carbon, carbonate-carbon, nitrogen, phosphorus, and sulfur values in surface sediments are related to concentrations at the Ambrosia horizon. It is concluded that cultural eutrophication of Lakes Ontario and Erie has resulted, so far, in a threefold increase in sediment organic matter, nitrogen, and phosphorus above the natural sediment level. South Bay, relatively unaffected by cultural eutrophication, shows no appreciable change in sediment concentrations of carbon, nitrogen, phosphorus, and sulfur. (See also W74-01798) (Jones-Wisconsin)
W74-01805

EFFECTS OF SEDIMENT DIAGENESIS AND REGENERATION OF PHOSPHORUS WITH SPECIAL REFERENCE TO LAKES ERIE AND ONTARIO,
Department of the Environment, Burlington (Ontario). Centre for Inland Waters.
J. D. H. Williams, and T. Mayer.
In: 'Nutrients in Natural Waters,' Wiley-Interscience, Division of John Wiley and Sons, Inc., New York, N.Y., 1972. p 281-315. 10 fig, 2 tab, 65 ref.

Descriptors: *Sediments, *Diagenesis, *Phosphorus, *Lake Erie, *Lake Ontario, Eutrophication, Nutrient removal, Cycling nutrients, Sediment-water interfaces, Kinetics, Phosphorus compounds.
Identifiers: *Eutrophication reversal.

Eutrophication reversal is discussed with consideration of possible influence of phosphorus regeneration from sediments on time required to reverse eutrophication, net phosphorus regeneration from sediment columns in idealized and actual situations, mechanisms for nutrient transfer from sediments, phosphorus forms, forms and amounts of phosphorus in Great Lakes sediment, and analysis of piston core samples. If inputs of phosphorus and nitrogen were reduced or increased to a new constant level, the concentrations of total phosphorus and nitrogen would asymptotically approach a new mean steady-state value. Provided oxic conditions are maintained, reduction in phosphorus input should result in more rapid attainment of a new mean steady-state phosphorus concentration than would be predicted if the role of sedimentation is ignored. The prevalent view is that, given a sufficient period of time and provided the rate of input of phosphorus is controlled sufficiently, even the most eutrophic lake will revert to an oligotrophic condition. If this is done, regeneration of a part of the excess phosphorus that accumulated in the sediments during the eutrophic conditions may extend the transition period and delay the attainment of oligotrophic conditions, but the ultimate trophic state of the lake should not be affected. (See also W74-01798) (Jones-Wisconsin)
W74-01806

DETERGENT DEVELOPMENTS AND THEIR IMPACT ON WATER QUALITY,
Procter and Gamble Co., Cincinnati, Ohio. Environmental Water Quality Research Dept.
J. R. Duthie.
In: 'Nutrients in Natural Waters,' Wiley-Interscience, Division of John Wiley and Sons, Inc., New York, N.Y., 1972, p 333-352. 3 fig, 21 ref.

Descriptors: *Detergents, *Water quality, Phosphates, Formulation, Environmental effects, Wastewater treatment, Feasibility, Surfactants, Nitrilotriacetic acid, Silicates, Soaps, Laundering, Public health, Carbonates, Toxicity, Biodegradation, Legislation.
Identifiers: *Soap and detergent industry, Procter and Gamble.

Pressure to reduce or remove phosphates from detergents has made this the overwhelming technical objective of the detergent industry. Some facts are presented about the overall assessment of detergent materials, along with a discussion of new developments and their potential impact. Although the detergent industry does not expect environmentalists or wastewater treatment experts to assume the industry's burden of finding alternatives for phosphates, certain things can be done to create the climate in which responsible and productive changes can be made. The contribution that today's detergents make to cleanliness and health standards should be evaluated. Detergent phosphates in proper perspective are imporatnt ingredients and, although an algal nutrient, they are not pollutants or poisons. Phosphate removal from detergents, unless accompanied by appropriate waste treatment, has little chance of broadly arresting eutrophication. The diverse problems of pollution certainly will not disappear conincident with elimination of phosphates. Legislation unrealistically banning current formula ingredients before tested replacements are available can lead to unknown human and environmental risks. For major population centers, the combination of physical/chemical/biological treatment will provide maximum flexibility to remove a wide range of potential nutrients. (See also W74-01798) (Jones-Wisconsin)
W74-01807

ROLE OF THE FEDERAL GOVERNMENT IN CONTROLLING NUTRIENTS IN NATURAL WATERS,
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
A. F. Bartsch.
In: 'Nutrients in Natural Waters,' Wiley-Interscience, Division of John Wiley and Sons, Inc., New York, N.Y., 1972, p 421-431. 1 tab, 19 ref.

Descriptors: *Legislation, *Nutrients, *Control, Eutrophication, Waste treatment, Federal Water Pollution Control Act, Regulation, Lake Superior, Lake Michigan, Lake Erie, Lake Ontario, St. Lawrence River, Potomac River, Runoff.
Identifiers: Enforcement, Clean Lakes Act.

Fundamental questions dealing with several preliminary philosophical points are first considered--what are the options in controlling eutrophication. How does nutrient control relate to them. What nutrients in natural waters should be controlled. Where do they come from and in what amounts. Public anxiety about degradation of lakes has stimulated action at every level of government. Efforts of the federal government to control nutrients in natural waters involve provision of grant funds to assist in construction of community waste treatment facilities that incidentally or by design remove nutrients before discharge, intramural and extramural research to generate new knowledge and to demonstrate and activate management technology needed for effective nutrient control, enforcement actions to compel compliance in preventive and restorative programs, and provision of enabling and regulatory legislation. In summary, under governmental stimulation, controlling municipal sources of nutrient input through advanced treatment processes is a response to the demand for voluntary and regulatory actions. Progress has been made in decreasing phosphorus inputs that originate in synthetic detergents, and action continues. The massive and important task remaining is to provide technology to cope effectively with diffuse land runoffs. (See also W74-01798) (Jones-Wisconsin)
W74-01808

DEVELOPMENT OF NUTRIENT CONTROL POLICIES IN CANADA,
Department of Energy, Mines and Resources, Ottawa (Ontario). Inland Waters Branch.
A. T. Prince, and J. P. Bruce.
In: 'Nutrients in Natural Waters,' Wiley-Interscience, Division of John Wiley and Sons, Inc., New York, N.Y., 1972, p 433-446. 13 ref.

Descriptors: *Legislation, *Nutrients, *Control, *Canada, *Eutrophication, Phosphates, Governments, Detergents, Sewage treatment, Great Lakes, Ontario, Algae, International Joint Commission, Carbon, Nitrogen, Phosphorus, Bicarbonates, Agricultural runoff, Lake Erie, Lake Ontario, Regulation, Hardness (Water), Feasibility, Nitrilotracetic acid, Economics, Public Health.
Identifiers: Canada Water Act.

Recognizing that nutrients, particulary phosphates, are the major contributors to eutrophication, the Advisory Boards to the International Joint Commission recommended an extensive program of nutrient discharge control, the most important step being control of phosphate discharges to the lower Great Lakes, with means of achieving the objective. An effective program to control phosphates must have three principal aims: reduction and eventual removal of phosphates from detergents, removal of phosphates and possibly other nutrients at waste treatment plants, and control of phosphates from agricultural sources. In response to recommendations of the International Joint Commission, the Government of Ontario has announced a policy of nutrient removal at the larger municipalities in the lower Great Lakes drainage basin. Research on improved agricultural practices to reduce nutrient discharges in continuing. Formulation of government policy in the complex area of environmental restoration and preservation presents legislators with the difficult problem of appraising often conflicting interpretations of research information. Involved are important considerations of economics, public health, and public interest. Task of providing information on which policy can be built, and providing it in a form relatively easy to assimilate, falls to economists and social scientists and their colleagues in natural sciences. (See also W74-01798) (Jones-Wisconsin)
W74-01809

HYBRIDIZATION STUDIES OF BLUE-GREEN ALGAL AND HIGHER PLANT CHLOROPLAST DNA,
Hospital for Sick Children, Toronto (Ontario). Div. of Biochemistry Research.
S. D. Kung.
Federation of European Biochemical Society, Vol 29, No 3, p 259-262, 1973. 2 fig, 1 tab, 14 ref.

Descriptors: *Chlorophyll, *Cyanophyta, *Biochemistry, Physicochemical properties, Bacteria, Genetics, Plant morphology.
Identifiers: *Dioxyribonucleic acid, *Chloroplast DNA, *Hybridization studies, Lyngbya, Bacillus subtilis.

There is considerable evidence from some comparative studies of RNA and proteins supporting the hypothesis that chloroplasts originated from blue-green algae. Evidence obtained by DNA-DNA hybridization studies between a blue-green alga and higher plant chloroplasts is presented which indicates some degree of base sequence homology. DNA's from broad bean chloroplasts and Lyngbya were prepared and characterized. In the hybridization experiments, an equal amount of chloroplast and Lyngbya DNA, and Lyngbya and Bacillus subtilis DNA were mixed and annealed together. The hybrid formed was detected by its position in the analytical ultracentrifuge after banding in a CsCl density gradient. Hybrid formation with different densities suggests that these hybrids either have different proportions of double and single stranded regions, and/or have different lengths of chloroplast and blue-green algal DNA. Nevertheless, formation of such hybrids suggests that chloroplast and Lyngbya DNA have some nucleotide sequences in common. Although the density gradient technique used in this study is not quantitative, it does allow visualization of the hybrid formation. Evidence suggesting qualitative partial homology between chloroplast (broad bean) and blue-green algal (Lyngbya) DNA is presented. (Jones-Wisconsin)
W74-01810

IMMUNOLOGICAL IDENTIFICATION OF PIGMENT COMPONENT OF A PHOTOCHEMICALLY ACTIVE CHROMOPROTEIN (ACP) ISOLATED FROM THE BLUE-GREEN ALGA ANABAENA CYLINDRICA,
Tokyo Univ. (Japan). Ocean Research Inst.
C-J. Pjon, and Y. Fujita.
Plant and Cell Physiology, Vol 14, No 1, p 201-205, 1973. 2 fig, 1 tab, 6 ref.

Descriptors: *Plant pigments, *Biochemistry, *Photoactivation, *Cyanophyta, Anabaena.
Identifiers: *Immunology, *Chromoprotein, Anabaena cylindrica, Phycocyanin.

An attempt to identify the immunology of c-phycocyanin as a component of the photochemically active chromoprotein (ACP) is described. ACP and phycocyanin, which had been isolated from Anabaena cylindrica, were used as antigens. Antisera were obtained by immunizing rabbits with complete Freund's adjunant. Anti-ACP did not inhibit ascorbate photooxidation when the reaction mixture contained the antigen-antibody complex. When the complex was removed from the reaction mixture photochemical activity disappeared. The small molecular size of ascorbate would allow it to reach the active site of ACP by passing through a geometrical barrier formed by the antigen-antibody complex. Results indicate that anti-ACP does not contain any antibodies which attack the active site of ACP. The antibody which reacted only with the ACP preparation may not be an ACP-antibody, but a contaminant in the ACP preparation. If it is a contaminant, then ACP can induce only the formation of the phycocyanin antibody. The fact that the complex formation between ACP and anti-ACP or anti-phycocyanin did not affect the photochemical activity or fluorescence characteristics of ACP, suggests that all components acting in the photochemical reaction are located in the inner part of the pigment complex. (Auen-Wisconsin)
W74-01811

CHARACTERISTICS OF NITRATE REDUCTION IN A MUTANT OF THE BLUE-GREEN ALGA AGMENELLUM QUADRUPLICATUM,
Texas Univ., Port Aransas. Inst. of Marine Science.
S. E. Stevens, Jr., and C. Van Baalen.
Plant Physiology, Vol 51, No 2, p 350-356, 1973. 6 fig, 3 tab, 31 ref.

Descriptors: *Nitrification, *Biochemistry, *Cyanophyta, Nitrates, Growth rates, Cytological studies, Plant pigments, Nitrogen, Photosynthesis.
Identifiers: *Mutant, *Agmenellum quadruplicatum.

Results of a beginning study of connection between photosynthesis and nitrate reduction are reported. Characteristics of nitrate reduction in terms of nitrite production in an N-methyl-N'-nitro-N-nitrosoguanidine-induced mutant of blue-green alga Agmenellum quadruplicatum are described. Following induction of nitrate reduction linear rate of nitrite production proportional to cell concentration was observed. Nitrite production rate and growth rate showed similar response to pH, temperature, and light intensity. Results do indicate in a substantial way that the reduction of nitrate to nitrite can be accomplished by a partial reaction of photosynthesis. A partial reaction of photosynthesis has the meaning that total throughput from the oxidation of water to the production of ATP and NADPH is not required. The deduction that at most only a partial reaction

of photosynthesis is required rests on the observations of very low requirement for carbon dioxide fixation, drastic reduction in c-phycocyanin content which does not affect nitrate reduction, large decrease in photosynthesis in terms of oxygen production without concomitant decrease in nitrate reduction, inhibition of photosystem II by DCMU or UV irradiation without significant effect upon the early rate of nitrite production, and the action spectrum of nitrate reduction. (Jones-Wisconsin)
W74-01812

A LIMNOLOGICAL SURVEY OF THE FRESHWATER COASTAL LAKES OF EAST GIPPSLAND, VICTORIA,
Monash Univ., Clayton (Australia). Dept. of Zoology.
B. V. Timms.
Australian Journal of Marine and Freshwater Research, Vol 24, No 1, p 1-20, 1973. 5 fig, 8 tab, 22 ref, 2 append.

Descriptors: *Baseline studies, *Limnology, *Lakes, *Australia, Geomorphology, Physical properties, Chemical properties, Aquatic plants, Zooplankton, Invertebrates, Littoral, Benthos, Fish, Forebays, Alkaline water, Daphnia, Acidic water, Isopods, Color, Light penetration, Hydrogen ion concentration, Lagoons, Annelids.
Identifiers: *East Gippsland (Australia), Victoria (Australia), Lake Elusive (Australia), Lake Barracoota (Australia), Boeckella minuta, Thermocyclops hyalinus, Daphnia lumholtzi, Calamoecia tasmanica, Gladioferens spinosus, Queensland (Australia), Sand dune lakes, Boccardia.

General limnological features of 11 of the larger and more accessible lakes in East Gippsland, Australia are reported with information given on physiography, major physical and chemical features, macrophytes, zooplankton, littoral invertebrates, benthos, and fish. Detailed morphometric maps were prepared for Lakes Elusive and Barracoota. In Lake Beadle the littoral is dominated by the emergent Eleocharis sphacelata. Other emergents include Baumea articulatum, Lepidosperma longitudinale, and Triglochin procera. At least 27 zooplankton species occur in the lakes. Among the copepods Boeckella minuta is the most common in the floodplain lakes around Orbost, and Calamoecia tasmanica in the coastal dune lakes. In Lake Barracoota Gladioferens spinosus is the only plankter recorded, and curiously it could be caught only at night. The cyclopoid copepods are world-wide forms and common in eastern Australia. The four floodplain lagoons are alkaline, dominated by sodium and bicarbonate ions. Zooplankton in each consists of Boeckella minuta, Thermocyclops hyalinus, Daphnia lumholtzi and other entomostracans. The coastal dune lakes are acid, dominated by sodium and chloride ions and contain one to three zooplankton species, including Calamoecia tasmanica. Lake Barracoota's recent marine origin is confirmed by the presence of two isopods and a polychaete with marine affinities. (Jones-Wisconsin)
W74-01813

TROPHIC DYNAMICS AND NICHES OF SALT MARSH FORAMINIFERA,
City Coll., New York. Dept. of Biology.
J. J. Lee, and W. A. Muller.
American Zoologist, Vol 13, No 1, p 215-223, 1973. 3 fig, 6 tab, 45 ref.

Descriptors: *Energy transfer, *Benthos, *Salt marshes, *Biological communities, Dynamics, Niches, Respiration, Littoral, Productivity, Biomass.
Identifiers: *Foraminifera, Allogromia laticollaris, Rosalina leei, Spiroloculina hyalina.

Trophic dynamics and energy of foraminifera whose niches are best known were studied to clarify two differing concepts: that among detritus-algae feeders only a few important species exist, all having very unrestricted diets, and that a more efficient pathway to community stability is achieved through many species, each with restricted diets. Three species of littoral benthic foraminifera, Allogromia laticollaris, Rosaline leei, and Spiroloculina hyalina, were grown in the laboratory. Algal biomass eaten was determined by measuring the volumes of 100 individual logarithmically growing algae cells. Log phase cells were chosen for measurement since they were used in the tracer feeding studies. In view of the high standing crops, turnover of species, and high ecological growth efficiency of salt marsh foraminifera, it is clear that they can play a significant role in the carbon budget and nutrient cycling within the detritus microbial assemblages of salt marshes. It seems reasonable to believe that stability and high rates of productivity in the microbial and micrometazoan assemblages of salt marshes are achieved through species diversity. (Jones-Wisconsin)
W74-01814

PLANKTON SUCCESSION IN A NEWFOUNDLAND LAKE,
Memorial Univ. of Newfoundland, St. John's. Dept. of Biology.
C. C. Davis.
Internationale Revue der Gesamten Hydrobiologie, Vol 57, No 3, p 367-395, 1972. 20 fig, 4 tab, 22 ref.

Descriptors: *Dominant organisms, *Plankton, *Succession, *Systematics, Lakes, Temperature, Phytoplankton, Zooplankton, Dinoflagellates, Benthic flora, Copepods, Ice cover, Coliforms, Rotifers, Anabaena, Nannoplankton, Cyanophyta, Chrysophyta, Diatoms, Pyrrophyta, Chlorophyta, Chlorella, Chlamydomonas, Protozoa, Crustaceans, Daphnia.
Identifiers: *Newfoundland (Hogan's Pond), Boreal lakes.

Hogan's Pond was investigated to supplement the meager information on freshwater plankton in Newfoundland's boreal lakes. It is an average sized lake, particularly interesting because Lake Erie whitefish (Coregonus clupeaformis) were planted in it in 1886, and still exist. Regular collecting trips were attempted every two weeks during June 1969 to October 1970 over the deepest spot in the lake. Qualitative plankton samples were obtained. Zooplankters were counted as individuals except for the colonial rotifer Conochilus unicornis which was recorded as number of colonies, with rough estimates of individuals per colony. For the most part the number of phytoplankton cells was counted, but with some forms this was not feasible; in such cases, number of sections of the filaments containing approximately 50 cells were estimated. Highest temperatures were attained in July-August, maximum being 18C in 1969 and 21.9C in 1970. Of the phytoplankton, details of Cyanophyta, Chrysophyta--Bacillariophyceae, Pyrrophyta, Chlorophyta, and phytoflagellates are given, including seasonal and vertical distributions. Seasonal succession of dominant and subdominant phytoplankters are discussed. Details are given of protozoa, rotifers, Cladocera, and Copepoda with the seasonal distributions of their various stages. (Jones-Wisconsin)
W74-01818

THE PHYTOTOXICITY OF CRUDE OIL SPILLS IN FRESHWATER,
Toronto Univ. (Ontario). Dept. of Botany; and Toronto Univ. (Ontario). Inst. of Environmental Sciences and Engineering.
T. C. Hutchinson, P. Kauss, and M. Griffiths.
Water Pollution Research in Canada, Vol 7, p 52-58, 1972. 6 fig, 6 tab, 19 ref.

Descriptors: *Toxicity, *Plant growth, *Oil spills, *Freshwater, Plankton, Algae, Acidity, Hydrogen ion concentration, Productivity, Water pollution effects, Chlorella.
Identifiers: Crude oil, Benzene, Toluene, Xylene, Chlorella vulgaris, Dinobryon, Peridinium, Tabellaria, Ankistrodesmus spiralis, Ankistrodesmus falcatus, Fragillaria, Chlorococcum.

Not only are high seas and continental shelves affected by oil spills, inland fresh waters, including lakes and rivers, are also being subjected to increased quantities of hydrocarbons, not least from untreated domestic and industrial wastes. Field and laboratory experiments were conducted to determine toxicity of crude oil, crude oil-water extracts, and selected oil components to planktonic algae. In the field, species differed markedly in response to an oil spill: Some were inhibited, others actually stimulated, while a third group was unaffected. The results emphasize the differences in response between species and suggest the actual planktonic composition of a water body is important in predicting oil spill effects. In the laboratory, aqueous extracts of 7 crude oils showed inhibitory effects but differed in degree of toxicity. This toxicity appeared to be reduced by volatilization of the toxic components. Oil extracts showed marked decreases in pH which were sufficient to cause a considerable suppression of algal growth, but when pH changes were artificially eliminated the aqueous extracts of oil still contained toxic properties. Benzene, toluene and xylene showed toxic properties. Cells generally could resume growth when the toxic factor was removed. (Jones-Wisconsin)
W74-01820

CADMIUM AND ZINC TOXICITY AND SYNERGISM TO FLOATING AQUATIC PLANTS,
Toronto Univ. (Ontario). Dept. of Botany; and Toronto Univ. (Ontario). Inst. of Environmental Sciences and Engineering.
T. C. Hutchinson, and H. Czyrska.
Water Pollution Research in Canada, Vol 7, p 59-65, 1972. 6 fig, 4 tab, 9 ref.

Descriptors: *Cadmium, *Zinc, *Floating plants, *Absorption, *Toxicity, Food chains, Industries, Mining, Pesticides, Fertilizers, Plant growth.
Identifiers: Synergism, Lemna valdiviana, Salvinia natans.

Experiments were designed to test relative toxicity of cadmium to floating aquatic plants, determine whether toxicity is related to actual uptake by the plants, assess potential concentration factor of cadmium in aquatic plants compared with water levels, determine effect of competitive stress on cadmium toxicity, and investigate possible Cd/Zn synergism. Lemna valdiviana and Salvinia natans were used as experimental material. They reproduce vegetatively to produce a floating photosynthetic mat on the water surface. Growth can be determined readily in terms of number of leaves or fronds, since each leaf has a finite size. Both species were found to accumulate the metals, from even very low levels in solution. Cadmium at 0.01 ppm had an inhibitory effect on growth and 0.1 ppm caused death. A concentration factor of up to 9500 times occurred. There were clear implications of potential food chain effects. Cadmium and zinc acted synergistically together. Zinc markedly increased the inhibitory effect of cadmium even though it was itself stimulatory. The presence of one metal also increased the uptake of the other. (Jones-Wisconsin)
W74-01821

THE EQUILIBRIUM AND STABILITY OF SIMPLE MARINE BIOLOGICAL SYSTEMS. I. PRIMARY NUTRIENT CONSUMERS,
Johns Hopkins Univ., Baltimore, Md. Dept. of Earth and Planetary Sciences.
O. M. Phillips.

The American Naturalist, Vol 107, No 953, p 73-93, 1973. 5 fig, 8 ref.

Descriptors: *Biological communities, *Equilibrium, *Stability, *Oceans, Ecosystems, Nutrients, Mathematical studies, Phytoplankton, Primary productivity.
Identifiers: *Primary consumers.

The general interactions among species of primary nutrient users competing for these nutrients in a homogeneous marine biological system are mathematically analyzed to determine exactly which properties of the functions concerned are necessary to assure system maintenance either in an equilibrium state or in a state with cyclic, possibly large-amplitude, oscillations. Conditions for equilibrium are, in absence of predation, the number of removable nutrients must be greater than or equal to number of primary consumer species and for each species involved there must be at least one domain of values of the removable nutrients in which this population alone can grow, all others dying out. Stability of an equilibrium state is studied in general and two examples are given in detail, one involving a single limiting nutrient and one species, the other with two limiting nutrients and one species. If population density is limited by toxic agents, equilibrium is generally unstable; instability can also be provoked by sufficiently strong cross-linkage in which assimilation rate of one nutrient depends strongly on concentration of another. Specific criteria for stability are presented: they generally depend on the forms of population growth rates and assimilation rates as functions of the concentrations involved. (Jones-Wisconsin)
W74-01822

EFFECTS OF SOME METABOLIC INHIBITORS ON HETEROCYST FORMATION IN THE BLUE-GREEN ALGA, ANABAENA DOLIOLUM,
Udaipur Univ. (India). Dept. of Botany.
V. V. S. Tyagi.
Annals of Botany, Vol 37, No 150, p 361-368, 1973. 9 fig, 19 ref.

Descriptors: *Nitrogen fixation, *Plant growth regulators, *Inhibitors, *Cyanophyta, Anabaena, Carbon, Photosynthesis, Plant physiology, Cytological studies, Respiration.
Identifiers: *Heterocysts, Anabaena doliolum, Adenosine triphosphate, 3,p-chlorophenyl dimethylurea, 2,4-dinitrophenol, Sodium azide, Maleic hydrazide, Iodoacetic acid.

Extensive studies on functional aspects of heterocysts aimed at the localization of nitrogenase activity have not resolved the problem of heterocyst nitrogen gas fixation. An alternative approach was the study of physiological conditions controlling heterocyst formation. Selected metabolic inhibitors--3,p-chlorophenyl dimethylurea (CMU), 2,4-dinitrophenol (DNP), sodium azide, maleic hydrazide (MH), and iodoacetic acid were used mainly with a view of discovering the relative role of photosynthesis and respiration in heterocyst formation. Non-heterocystous filaments, 1-week old, were used as the experimental material. CMU, DNP, iodoacetic acid, and sodium azide inhibit heterocyst formation, whereas maleic hydrazide does not. Glucose promotes the frequency of heterocysts and is very effective in counteracting the inhibition by CMU and sodium azide. The DNP inhibition is not reversed by glucose but adenosine triphosphate (ATP) causes a partial reversal. The iodoacetic acid inhibition is reversed partially by pyruvic acid; ATP and glucose are ineffective in this case. Red light increases heterocyst frequency; green and blue lights are inhibitory. In view of the mechanisms of the activity of the inhibitors it is concluded that heterocyst formation depends on the availability of carbon intermediates and ATP. The former is supplied by photosynthesis and the latter most probably by oxidative metabolism. (Jones-Wisconsin)
W74-01823

SULPHATED POLYSACCHARIDE SYNTHESIS IN BROWN ALGAE,
Leeds Univ. (England). Dept. of Plant Sciences.
L. V. Evans, M. Simpson, and M. E. Callow.
Planta (Berl.), Vol 110, No 3, p 237-252, 1973. 25 fig, 28 ref.

Descriptors: *Phaeophyta, *Biochemistry, *Cytological studies, *Carbohydrates, Synthesis, Sea water, Plant physiology.
Identifiers: *Sulphated polysaccharides, Pelvetia canaliculata, Fucose, Laminaria, Goldi complex, England, Fucus.

Sites of synthesis, transport and subsequent location of sulphated polysaccharides in the Fucales and Laminariales were studied. Microscopy and autoradiography were used on plants selected for widely differing sulphated polysaccharide content. Brown algal carbohydrate composition is dependent on many factors; degree of exposure to air is one of the main factors determining relative amounts of sulphated polysaccharide present. Pelvetia canaliculata and Fucus spiralis, which grow high on the shore and are exposed for the longest periods have large amounts of fucoidan, while Fucus serratus, which grows low on the shore, has much less. In the Laminariales, which experience relatively little exposure to the air, sulphated polysaccharides constitute only some 5% dry weight and variation in carbohydrate composition is largely seasonal. The most rapid uptake of sulphate-35 occurred when material was incubated in a medium with 0.0001 M carrier sulphate, negligible uptake occurring from seawater. Autoradiography using sulphate-35 shows that sulphated material is synthesized by all cell types, particularly epidermal cells of Pelvetia. This activity is confined to specialized secretory cells which discharge into mucilage canals in Laminaria. In both instances the process of carbohydrate sulphation appears to occur in the Golgi-rich perinuclear region. (Jones-Wisconsin)
W74-01824

CYANOPHAGE AC-1: A PHAGE INFECTING UNICELLULAR AND COLONIAL BLUE--GREEN ALGAE,
Indian Agricultural Research Inst., New Delhi. Div. of Microbiology.
G. S. Venkataraman, B. D. Kaushik, G. Subramanian, S. Shanmugasundaram, and A. Govindarajan.
Current Science, Vol 42, No 3, p 104-105, 1973. 2 fig, 10 ref.

Descriptors: *Algae, *Cyanophyta, *Plant diseases, Viruses.
Identifiers: *Cyanophage AC-1, *India, Anacystis nidulans, Chroococcus minor.

Blue-green algal phages types SM-1 and AS-1 infect unicellular blue-green algae and C-1 and AR-1 infect heterocystous and sporulating forms. A phage newly isolated from a waste stabilization pond at the Indian Agricultural Research Institute, New Delhi is reported, which unlike the SM and AS phages, infects both the unicellular Anacystis nidulans and the colonial chroococcoid Chroococcus minor. Detailed studies have previously been published only on Cyanophages of the LPP, SM and AS types. This newest viral type, in accordance with the system of nomenclature set forth for Cyanophages, has been designated as AC-1. It was initially detected through its lysis of a laboratory culture of Anacystis nidulans, strain No. 14011, and its isolation and host range were determined. It was found to be ineffective on a number of heterocystous and non-heterocystous blue-green algal strains. Besides Anacystis nidulans, Chroococcus minor (ARM 18) was the only other alga found to be susceptible. Of the two hosts, the larger plaques were formed with C. minor. Adsorption rates were studied under conditions similar to those used in the propagation of the phage and show a linear trend. (Jones-Wisconsin)
W74-01825

THE FINE STRUCTURE OF AMOEBOAPHELIDIUM PROTOCOCCARUM GROMOV ET MAMKAEVA--AN ENDOPARASITE OF GREEN ALGA SCENEDESMUS,
Leningrad State Univ. (USSR). Biological Inst.
B. V. Gromov, and K. A. Mamkaeva.
Archiv fur Hydrobiologie, Vol 67, No 4, p 452-459, 1970. 15 fig, 19 ref.

Descriptors: *Scenedesmus, *Protozoa, *Plant diseases, *Parasitism, Algae, Cytological studies, Systematics, *Chlorophyta.
Identifiers: *Amoeboaphelidium protococcarum, Ultrastructure, Amoeba.

Amoeboaphelidium protococcarum is a parasite of the genus Scenedesmus and some other protococcous algal genera. It provides a convenient model for experimental investigations because it is not too difficult to obtain and cultivate in artificial media, solid, semisolid, or liquid, and can be isolated from natural habitats. According to recent observations, it is widely distributed in natural conditions where evidently it has a definite influence on the growth of sensitive algae; at least its development has a drastic effect on large-scale Scenedesmus cultures. From examination of several strains of parasites, the sensitivity of the given culture of Scenedesmus to the different parasites proved to be characteristic of the culture or clone, and this character seems to be useful for the description and differentiation of Scenedesmus cultures. A. protococcarum ultrastructure possesses all the organelles characteristic of an eucariotic cell. The vegetative body grows as a naked amoeba and captures host cell contents during phagocytosis. The mature body subdivides into new amoebae which leave the destroyed cell and infects new algal cells. It has some characteristics in common with lower fungi--chytrids and myxomycetes--but may represent an independent group of parasitic microorganisms. (Jones-Wisconsin)
W74-01826

LIMNOLOGICAL STUDIES ON A SOUTHEAST TEXAS MEANDER SCAR LAKE,
Lamar Univ., Beaumont, Tex. Dept. of Biology.
R. C. Harrel.
Texas Journal of Science, Vol 24, No 4, p 517-533, 1973. 8 fig, 7 tab, 12 ref.

Descriptors: *Limnology, *Texas, *Lakes, *Flood plains, *Thermal stratification, Dissolved oxygen, Hydrogen ion concentration, Carbon dioxide, Alkalinity, Turbidity, Specific conductivity, Dissolved solids, Geologic history, Benthic fauna, Vertical migration, Chlorophyta, Cyanophyta, Daphnia, Zooplankton, Biological communities, Aquatic plants, Physicochemical properties, Temperature, Secchi disks, Euglenophyta, Chrysophyta, Rotifers, Gastropods, Crustaceans, Plankton, Fish, Diptera.
Identifiers: *Massey Lake (Texas), Meander lakes, Pilecypods, Chaoborus punctipennis.

Basic physicochemical and biological data were obtained during limnological studies of Massey Lake, a southeast Texas meander scar lake during May 1967 to July 1969. Recreational aspects of flood plain lakes are increasing as the larger reservoirs become more crowded, and the rivers become more industrialized. A warm monomictic lake, Massey Lake is isothermal only during January and February. During stratification dissolved oxygen and pH decreased with depth, while carbon dioxide, alkalinity, turbidity, specific conductance, and dissolved solids increased with depth. Most of the year all but the upper 2 to 4 m

of water are anoxic. Only two species of aquatic vascular plants were observed. Collections were made of 47 benthic macroinvertebrate taxa. The dominant benthic, Chaoborus punctipennis, formed over 85% of the total number of individuals. Species diversity decreased with depth to zero at 3 m. Vertical migration was exhibited by Chaoborus which moved down as light intensity increased, and toward the surface with decreased light intensity. Green algae were dominant during colder months, while bluegreens were dominant during warm months. The most abundant zooplankton were Daphnia pulex and Kellicottia. Eighteen fish species were collected. (Jones-Wisconsin)
W74-01828

COPRECIPITATION OF PHOSPHATE WITH CARBONATES IN A MARL LAKE,
Michigan State Univ., Hickory Corners. W. K. Kellogg Biological Station.
For primary bibliographic entry see Field 02H.
W74-01843

URBAN GROWTH AND THE WATER REGIMEN. HYDROLOGIC EFFECTS OF URBAN GROWTH,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 04C.
W74-01847

KINETICS OF ROTENONE-POTASSIUM PERMANGANATE REACTIONS AS APPLIED TO THE PROTECTION OF TROUT STREAMS,
New York State Dept. of Environmental Conservation, Delmar. Dept. of Aquatic Biology.
R. Engstrom-Heg.
N Y Fish Game J. Vol 19, No 1, p 47-58. 1972. Illus.
Identifiers: Kinetics, *Potassium, Protection, *Rotenone, Streams, *Trout, *Detoxification.

Rates of rotenone detoxification by KMnO4 were estimated by arresting the reaction with tannic acid and estimating rotenone residues by bioassay. At rotenone concentrations up to 50 ppb (1 ppm 5% emulsifiable product), detoxification occurs at a negative exponential rate directly proportional to the KMnO4 concentration. Other rates are characteristic of higher concentration ranges. At any given rotenone concentration, detoxification time is inversely proportional to KMnO4 concentration. Temperature has little effect on detoxification rates. Rates for given KMnO4 and rotenone concentrations are slightly slower in hard than in soft water. Colloidal rotenone in saturated or freshly prepared dispersions is more difficult to detoxify than dissolved retenone. Correction factors are given for hard water and for water containing organic material. Detoxification criteria are those for trout. Detoxification need not progress as far for centrarchids. Sodium thiosulfate may be used to treat toxic concentrations of KMnO4 in streams.--Copyright 1973, Biological Abstracts, Inc.
W74-01891

ARSENIC CONTENT OF FISH FROM NEW YORK STATE WATERS,
Cornell Univ., Ithaca, N.Y. Pesticide Residue Lab.
I. S. Pakkala, M. N. White, D. J. Lisk, G. E. Burdick, and E. J. Harris.
N Y Fish Game J. Vol 19, No 1, p 12-31. 1972. Illus.
Identifiers: *Arsenic, Fish, *New York, *Trout, Lakes, Rivers.

A survey of 471 fish sampled in 1969 from 49 New York State waters for total arsenic content is presented. Arsenic levels ranged up to about 0.5 ppm with fish from Lake Ontario, Canandaigua Lake and the Hudson, St. Lawrence and Salmon Rivers. Larger fish generally contained higher arsenic concentrations. Arsenic did not appear to be cumulative with increasing age in lake trout ranging from 2-11 yr.--Copyright 1973, Biological Abstracts, Inc.
W74-01900

STAGES OF DEVELOPMENT OF YOUNG SALMON IN THE CHAIKEND SALMON-BREEDING FACILITY, (IN RUSSIAN),
For primary bibliographic entry see Field 08I.
W74-01901

SEDIMENTATION OF SUSPENDED MATTER BY DREISSENA POLYMORPHA PALLAS AND ITS SUBSEQUENT UTILIZATION BY CHIRONOMIDAE LARVA,
Moscow State Univ. (USSR). Faculty of Biology and Soil Science.
E. I. Izvekova, and A. A. Lvova-Katchanova.
Pol Arch Hydrobiol. Vol 19, No 2, p 203-210. 1972.
Identifiers: Bacteria, *Chironomidae, Chironomus-Anthracinus, *Dreissena-Polymorpha, Endochironomus-Albipennis, Larvae, Potamogeton-Sp, *Sedimentation, Suspended matter, *USSR (Uchnskoye), Reservoirs.

During the summer months in the Uchnskoye water reservoir, USSR, D. polymorpha Pallas excretes 48.8 tons dry weight per day of the agglutinated seston in the form of feces and pseudofeces. The possibility of utilization of this matter by Chironomidae larvae (Endochironomus albipennis Mg. and Chironomus anthracinus Zett.) was investigated. Newly born larvae were kept until the third instar on various food which was agglutinated or not by D. polymorpha, such as natural suspended matter, mud and detritus originating from Potamogeton sp. Pseudofaeces of D. polymorpha were richer in bacteria than the original seston. The suspended matter agglutinated by D. polymorpha was the most valuable food source for Chironomidae larvae.--Copyright 1973, Biological Abstracts, Inc.
W74-01904

REPORT ON OSCILLATORIA (SUBGENUS SPIRULINA) PLANTENSIS (NORDST.) BOURRELLY (CYANOPHYTA) IN CHAD, (IN FRENCH),
Office de la Recherche Scientifique et Technique Outre-Mer, Fort-Lamy (Chad).
A. Iltis.
Cah O R S T O M (Off Rech Sci Tech Outre-Mer) Ser Hydrobiol. 5 (1): 53-72. Illus. 1971. (English summary).
Identifiers: Africa (Equatorial), *Chad, *Cyanophyta, Food, Human, Oscillatoria-Platensis, Salinity, Spirulina, Subgenus, Algae, Lakes.

Oscillatoria platensis is found in Chad (Equatorial Africa) in the temporary or permanent natroned waters located on the one hand directly at the northeast of the Chad Lake (Kanem), on the other hand at the northeast of Largeau (Borkou). This alga reaches great densities, particularly in permanent lakes having a high saline concentration (30 to 40 g/l). In the temporary ponds, flooded during more than 3-4 mo., O. platensis develops, but the densities, particularly in permanent lakes having a high saline concentration (30 to 40 g/l). In the temporary ponds, flooded during more than 3-4 mo., O. platensis develops, but the densities are less and the proportion of alien organisms is generally more important. A very localized part of the Chad population reaps and utilizes for food this cyanophyte. This one is used in the making of sauces and the amounts ingested daily are rather small. The percentage of proteins is equal or exceeds 50% of the weight of dry matter. The present information is yet very incomplete particularly about biology of this species and its capacity of production in the different natural natroned media in Chad.--Copyright 1973, Biological Abstracts, Inc.
W74-01905

OYSTER DRILL (OCINEBRA JAPONICA) CONTROL,
Washington State Dept. of Fisheries, Olympia.
For primary bibliographic entry see Field 05G.
W74-01917

SIGNIFICANCE OF CELLULOSE PRODUCTION BY PLANKTONIC ALGAE IN LACUSTRINE ENVIRONMENTS,
Massachusetts Univ., Amherst. Water Resources Research Center.
J. Rho, T. Reynolds, and W. Litsky.
Available from the National Technical Information Service as PB-225 542/0 $4.25 in paper copy, $1.45 in microfiche. Completion Report, November, 1972. 100 p, 15 fig, 15 tab, 109 ref. OWRR B-006-MASS (2).

Descriptors: *Phytoplankton, *Cellulose, *Aquatic algae, *Aquatic environment, Lakes, Chlorophyta, Chrysophyta, Pyrrophyta, Eutrophication, Oligotrophy, Dystrophy, Ponds, Carbohydrates, Dinoflagellates, Plant tissues, Vascular tissues, Bodies of water.
Identifiers: *Fate of pollutants, Particulate matter, Vertical distribution, Absorption spectra.

Numbers and type of cellulose-containing algae were observed in an eutrophic pond, a dystrophic pond and an oligotrphic lake. The cellulose-containing algae, members of Chlorophyceae, Dinophyceae and Chrysophyceae, were estimated to be approximately 70 percent of the total phytoplankton population observed. Fourteen algal species representing the dominant cellulose-containing phytoplankton were investigated for cellulose content which accounted for 2-39 percent on a dry weight basis of the cells studied. The amounts of cellulose present in the water column ranged from 110-1,185 micrograms/1, which accounted for 4-50 percent of the total dry weight of particulate matter. A comparison of adsorption spectra of the extracts from algae, higher plants, particulate matter from bodies of water studied and purified cellulose, indicated that the cellulosic material present in particulate matter was of algal origin. It was estimated that less than 30 percent of cellulose in the water column was actually contributed by the viable algal cells present aat the time of sampling. There was more cellulose found in the water column than could be accounted for by the number of algal cells observed.
W74-01927

ACIDOPHILIC THIOBACILLI IN THE RIVER SIRPPUJOKI,
Helsinki Univ. (Finland). Dept. of Microbiology.
For primary bibliographic entry see Field 05B.
W74-01946

BACTERIOLOGICAL STUDIES ON GRAVEL PIT LAKES (BAKTERIOLOGISCHE UNTERSUCHUNGEN AN BAGGERSEEN),
For primary bibliographic entry see Field 05A.
W74-01976

DISTRIBUTION PATTERN OF STREPTOMYCETES FROM FLOODED GANGES WATER,
S. K. Batra, M. Srivastava, and H. V. Sahni.
Indian J Exp Biol. Vol 10, No 6, p 439-441. 1972.
Identifiers: Classification, *Distribution patterns, Floods, Fusarium-oxysporum, *India (Ganges), Morphology, Mycelium, Pentaene, Polyene antibiotics, Saccharomyces-cerevisiae, *Streptomycetes, Water pollution.

Color, morphology and antagonism were used in grouping 607 isolates of streptomycetes from flooded Ganges River, India water. The majority were of the gray color series. The ability to produce melanin was quite widespread except in isolates with yellow and green aerial mycelium. Spira and retinaculum-apertum morphology was

most predominant in all color groups. In the yellow color series the 2 morphological groups, retinaculum-apertum and spira and straight to flexuous, occur in almost equal proportions. Fusarium oxysporum was antagonized by 12.8% of isolates and Saccharomyces cerevisiae by 15.4%. Polyene antibiotic producers numbered 29.6% and the majority produced pentaenes. All isolates with biverticillate morphology were polyene antibiotic producers.--Copyright 1973, Biological Abstracts, Inc.
W74-01980

UREA AND OTHER NITROGENOUS NUTRIENTS IN LA JOLLA BAY DURING FEBRUARY, MARCH AND APRIL 1970,
Johns Hopkins Univ., Baltimore, Md. Chesapeake Bay Inst.
For primary bibliographic entry see Field 05B.
W74-01993

EFFECT OF ARTEFACT POLLUTION ON THE VIABILITY OF SEABIRD COLONIES ON LONG ISLAND, NEW YORK,
American Museum of Natural History, New York. Dept. of Ornithology.
M. Gochfeld.
Environ Pollut. Vol 4, No 1, p 1-6. 1973.
Identifiers: Birds, Breeding, Chemical contamination, Destruction, Food, Habitat, Mortality, *New York (Long Island), Pollution, Viability, *Seabird colonies.

Colonies of several species of seabirds and freshwater birds persist on Long Island, even in close proximity to metropolitan New York City. Habitat destruction, chemical contamination of water and food sources and direct interference by humans pose the main hazards to these birds. Efforts were made to minimize the impact of such well-known distrubances. In certain areas, the colonies seem to be thriving. Studies of breeding success and mortality revealed that human artefacts such as trash scattered on the beaches or jetsam washed ashore may contribute significantly to the mortality of certain species. This is a readily controllable form of environmental contamination which involves no philosophical or economic conflicts.--Copyright 1973, Biological Abstracts, Inc.
W74-02001

ENVIRONMENTAL POLLUTION, A SURVEY EMPHASIZING PHYSICAL AND CHEMICAL PRINCIPLES,
Iowa State Univ., Ames. Dept. of Physics.
For primary bibliographic entry see Field 05B.
W74-02002

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE BEAVER VALLEY POWER STATION, UNIT 1.
Directorate of Licensing (AEC), Washington, D.C.

Available from NTIS, Springfield, Va., as Report No. Docket 50334-80, $7.60 per copy, $1.45 microfiche. Report No. Docket 50334-80, July 1973. 301 p, 19 fig, 40 tab, 76 ref, 3 append.

Descriptors: *Ohio River, *Nuclear powerplants, Effluents, Environment, Administrative agencies, Comprehensive planning, *Sites, Geology, Investigations, Hydrology, Seismology, Climatology, Meteorology, Ecology, *Radioactive wastes, Water pollution, Water pollution sources, Radioactive effects, Monitoring, Public health, Transportation, Beneficial use, Cost-benefit analysis, *Pennsylvania.
Identifiers: *Pressurized water reactors, *Environmental Impact Statements.

The Beaver Valley Power Station Unit 1 is located on the Ohio River near Shippingport in Beaver County, Pennsylvania. The facility utilizes a pressurized water reactor with waste heat disposal accomplished through the use of a closed-cycle natural-draft cooling tower. This final environmental statement relates to the proposed continuation of the construction permit and the issuance of an operating license for the Beaver Valley Power Station, Unit 1. Environmental impacts are assessed and after consideration of alternatives an environmental benefit-cost summary was compiled. Environmental factors considered include climate, hydrology (surface water and ground water), ecology including aquatic life, cooling-water supply and discharge, cooling towers, cooling lakes, spray ponds, radioactive chemical and sanitary wastes, amount of dissolved oxygen and toxic chemicals in effluent water. The conclusion is to continue the construction permit and issue an operating license for the facility subject to the following conditions: (1) Augment the preoperational radiological monitoring program. (2) Define certain comprehensive environmental monitoring programs for inclusion in the technical specifications - these to consider aquatic organism, residual chlorine and chloramine, thyroid dose, and herbicides. (3) Provide plans to minimize any irreversible damage seen or expected. (See also W74-02005) (Houser-ORNL)
W74-02004

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE BEAVER VALLEY POWER STATION, UNIT 2.
Directorate of Licensing (AEC), Washington, D.C.

Available from NTIS, Springfield, Va., as Report No. Docket 50412-25, $7.60 per copy, microfiche. Report No. Docket 50412-25, July 1973. 310 p, 23 fig, 39 tab, 80 ref, 3 append.

Descriptors: *Nuclear powerplants, Effluents, Environment, Administrative agencies, Comprehensive planning, *Sites, Geology, Investigations, Hydrology, Seismology, Climatology, Meteorology, Ecology, *Radioactive wastes, Water pollution, Water pollution sources, Radioactive effects, Monitoring, Public health, Transportation, Beneficial use, Cost-benefit analysis, *Ohio River, *Pennsylvania.
Identifiers: *Pressurized water reactors, *Environmental Impact Statements.

This final environmental statement was prepared in compliance with the National Environmental Policy Act and relates to the proposed construction of the Beaver Valley Power Station, Unit 2. This station will be located on the Ohio River near Shippingport in Beaver County, Pennsylvania, and will utilize a pressurized water reactor. The disposal of waste heat is accomplished through the use of a closed-cycle, natural-draft cooling tower. Environmental impacts are assessed and after consideration of alternatives an environmental benefit-cost summary was compiled. Environmental factors considered include climate, hydrology (surface water and ground water), ecology including aquatic life, cooling-water supply and discharge, cooling towers, cooling lakes, spray ponds, radioactive chemical and sanitary wastes, amount of dissolved oxygen and toxic chemicals in effluent water. The conclusion is to issue a construction permit for the facility subject to the following conditions: (1) Augment present Radiological Monitoring Program to obtain precise background data. (2) Reduce iodine releases to less than 5 millirems/year. (3) Comply with federal and state regulations for use of herbicides on transmission line right-of-way. (4) Implement a monitoring program to determine detrimental effects and supply a plan of action against any such effects detected. (See also W74-02004) (Houser-ORNL)
W74-02005

FINAL ENVIRONMENTAL STATEMENT RELATED TO OPERATION OF TROJAN NUCLEAR PLANT.
Directorate of Licensing (AEC), Washington, D.C.

Available from NTIS, Springfield, Va., as Report No. Docket 50344-66, $10.60 per copy, $1.45 microfiche. Report No. Docket 50344-66, August 1973. 376 p, 51 fig, 52 tab, 172 ref, 13 append.

Descriptors: *Oregon, *Columbia River, *Nuclear powerplants, Effluents, Environment, Administrative agencies, Comprehensive planning, *Sites, Geology, Investigations, Hydrology, Seismology, Climatology, Meteorology, Ecology, *Radioactive wastes, Water pollution, Water pollution sources, Radioactive effects, Monitoring, Public health, Transportation, Beneficial use, Cost-benefit analysis, Milk, Archaelogy.
Identifiers: *Pressurized water reactors, *Environmental Impact Statements.

The Trojan plant is located in the state of Oregon, Columbia County, on the Columbia River upstream from Rainier, Oregon. It will employ a single pressurized water reactor cooled by a natural draft cooling tower. Makeup water will be taken from the Columbia River and a very small portion of the water returned to the river. This final environmental statement was prepared in compliance with the National Environmental Policy Act and relates to the proposed continuation of construction permit and issuance of an operating license for the Trojan Nuclear Plant. Environmental impacts are assessed and after consideration of alternatives an environmental benefit-cost summary was compiled. Environmental factors considered include climate, hydrology (surface water and ground water), ecology including aquatic life, cooling-water supply and discharge, cooling towers, cooling lakes, spray ponds, radioactive chemical and sanitary wastes, amount of dissolved oxygen and toxic chemicals in effluent water. The conclusion is to continue the construction permit and issue an operating license subject to the following conditions: (1) No impingement upon areas of archeological interest. (2) Follow environmental criteria for transmission system. (3) Monitor aspects of intake pumping and aquatic ecology. (4) Comply with appropriate water-quality standards. (5) Include milk sampling in Radiological Monitoring Program. (6) Maintain awareness of grazing of cows. (7) Comply with technical specifications. (Houser-ORNL)
W74-02006

EFFECTS OF OCEAN WATER ON THE SOLUBLE-SUSPENDED DISTRIBUTION OF COLUMBIA RIVER RADIONUCLIDES,
Oregon State Univ., Corvallis.
D. W. Evans.
Available from NTIS, Springfield, Va., as RLO-2227-T-12-38; $5.45 in paper copy, $1.45 in microfiche. Report RLO-2227-T-12-38, June 1973. 65 p, 6 fig, 5 tab, 37 ref, 3 append.

Descriptors: *Columbia River, *Radioisotopes, *Suspended solids, *Leaching, Estuarine environment, Zinc radioisotopes, Colloids, Tracers, Public health, Path of pollutants, Cation exchange, Mixing, Sediments.
Identifiers: Manganese radioisotopes.

Radionuclide desorption from suspended solids in the Columbia River estuary is important both for biological availability and for tracing stable-element reactions. Desorption resulted only with radionuclides in cationic form (Zn65 was 15-45% desorbed; Mn54, 30-60%) and not with anionic or uncharged forms (Cr51, Sc46, and Sb124). There was no evidence of precipitation reactions of radionuclides or of absorption reactions as a consequence of mixing of river water and seawater within the estuary. Possible reasons that Zn65 desorption was greater from suspended solids than

from bottom sediments are: (1) larger surface-to-volume ratio, (2) greater content of clay phytoplankton and suspended algae, and (3) less aging. (Bopp-ORNL)
W74-02012

THE MONITORING OF TRITIUM IN THE AQUATIC ENVIRONMENT OF POWER REACTORS,
Radiation Management Corp., Philadelphia, Pa.
For primary bibliographic entry see Field 05B.
W74-02015

ANALYSIS FOR TRITIUM IN WATER: INTERCOMPARISON STUDY OF NOVEMBER 1970,
Analytical Quality Control Service, Winchester, Mass.
For primary bibliographic entry see Field 05B.
W74-02016

TRITIUM RELEASES FROM NUCLEAR POWER STATIONS,
National Environmental Research Center, Cincinnati, Ohio.
For primary bibliographic entry see Field 05B.
W74-02017

ENVIRONMENTAL TRITIUM CONTAMINATION FROM NUCLEAR POWER PROGRAM,
Bhabha Atomic Research Centre, Bombay (India). Health Physics Div.
For primary bibliographic entry see Field 05B.
W74-02018

TRITIUM GENERATION AND RELEASE TO IN-PLANT AND OFF-SITE ENVIRONS OF THE LA CROSSE BOILING WATER REACTOR,
Dairyland Power Cooperative, LaCrosse, Wis.
For primary bibliographic entry see Field 05B.
W74-02019

ENVIRONMENTAL TRITIUM SURVEILLANCE FOR PROJECT RULISON,
National Environmental Research Center, Las Vegas, Nev.
For primary bibliographic entry see Field 05B.
W74-02020

EXPERIMENTAL RESULTS FROM PROCESSING GASBUGGY GAS IN A NATURAL GAS PROCESSING PLANT,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 05B.
W74-02021

ENVIRONMENTAL TRITIUM STUDIES AT A PWR POWER PLANT,
New York Univ. Medical Center, N.Y.
For primary bibliographic entry see Field 05B.
W74-02022

TRITIUM INTAKE IN NEW YORK,
New York Operations Office (AEC), N.Y. Health and Safety Lab.
For primary bibliographic entry see Field 05B.
W74-02023

RADIOTRACER TECHNIQUE FOR THE STUDY IN VIVO OF THE BIOLOGICAL PATHWAY OF HEAVY METALS IN AQUATIC ORGANISMS,
European Atomic Energy Community, Ispra (Italy). Joint Nuclear Research Center.
F. Girardi, M. Merlini, C. Bigliocca, G. Pozzi, and A. Berg.
Available from UNIPUB, Inc., P.O. Box 433, New York, N.Y. 10016. In: Nuclear Techniques in Environmental Pollution, Vienna; International Atomic Energy Agency, p 721-733, 1971. (STI/PUB-268; CONF-701023).

Descriptors: *Radioisotopes, *Animal metabolism, *Fish, *Water pollution effects, Food chains, Public health, Radioactivity effects, Path of pollutants, Tracers, Radioactivity techniques, Computer programs, Data processing, Instrumentation, Radioecology, *Heavy metals.
Identifiers: *Mercury radioisotopes.

Preliminary results are reported of a study of Hg uptake by fish using Hg-203 as a tracer. Biological pathways during absorption were studied by means of a collimated detector. Radioactivity mappings both of the whole animal and of discrete organs were obtained by a system which is still in the developmental stage. An automated gamma-ray spectrometer is used for multi-tracer experiments. Direct connection with an IBM 360/65 computer speeds analysis. (Bopp-ORNL)
W74-02025

RADIONUCLIDES IN ECOSYSTEMS.
For primary bibliographic entry see Field 05B.
W74-02046

STABLE MANGANESE AND MANGANESE-54 DISTRIBUTIONS IN THE PHYSICAL AND BIOLOGICAL COMPONENTS OF THE HUDSON RIVER ESTUARY,
New York Univ. Medical Center, N.Y.
For primary bibliographic entry see Field 05B.
W74-02048

ACCUMULATION OF SOLUBLE AND PARTICULATE RADIONUCLIDES BY ESTUARINE FISH,
National Marine Fisheries Service, Beaufort, N.C.
For primary bibliographic entry see Field 05B.
W74-02049

RESPONSE OF BLUE-GREEN ALGAE TO TECHNETIUM,
Texas Univ., Port Arkansas. Inst. of Marine Science.
P. J. Gearing, C. Van Baalen, and P. L. Parker.
In: Radionuclides in Ecosystems, Proceedings of 3rd National Symposium on Radioecology, May 10-12, 1971. Oak Ridge Tennessee, p 857-865. (1971) 3 fig, 8 tab, 18 ref. (CONF-710501).

Descriptors: *Marine algae, *Cyanophyta, *Water pollution effects, *Toxicity, Chemicals, Absorption, Cytological studies, Biochemistry, Radioecology.
Identifiers: *Technetium.

Technetium, a missing element on the earth, has chemical properties similar to the biologically important elements manganese and molybdenum. Technetium-99 as pertechnetate has a specific chemical effect on the blue-green algae Agmenellum quadruplicatum, Coccochloris elabens, and Anacystis nidulans. All three species behave similarly toward the ion, the only difference being in their relative sensitivities. A fraction of the algal cell population is killed upon initial exposure to pertechnetate, in the light. While the lethal concentration (about that of bromide in the ocean) may never be reached in an actual ecosystem, this completely artificial element which appears to be biologically active provides a unique tool for the study of the impact of a 'unique' pollutant on ecosystem. (See also W74-02046) (Bopp-ORNL)
W74-02050

SERUM ELECTROLYTES AND SKELETAL MINERALIZATION IN HARD- AND SOFT-WATER AREAS,
T. W. Anderson.
Can Med Assoc J. Vol 107, No 1, p 34-37, 1972. Illus.
Identifiers: *Canada (Ontario), Cardiovascular disease, *Electrolytes, *Hard water, Mineralization, Serum levels, *Soft water, *Calcium, Magnesium, *Water supply, Municipal water.

Serum levels of Ca and Mg were measured in 2 Ontario (Canada) cities that differ widely in the hardness of their local water supply. The hypothesis being tested was that residents of the city with the hard water supply (and a low cardiovascular death rate) would show relatively high serum levels of Ca and/or Mg. In addition, a comparison was made of the cortical thickness of the second metacarpal bone in the 2 areas to see if there was any evidence of increased skeletal mineralization in the hard water area. The results obtained did not support either of these hypotheses, but failure to demonstrate differences in body-levels of Ca or Mg may not be incompatible with 1 (or both) of these water-borne elements functioning as the 'water-factor' in cardiovascular disease.--Copyright 1973, Biological Abstracts, Inc.
W74-02053

EFFECT OF IONIZING RADIATION ON THE ORGANISM. THE EFFECT OF RADIOACTIVE WATER POLLUTION ON THE REPRODUCTION OF COMMERCIAL FISHES.

Available from NTIS, Springfield, Va., as AEC-tr-7418; $7.60 in paper copy, $1.45 in microfiche. Trans. of Trudy Polyar Nauck Issled, 1971. AEC Translation 7418, 1971. 182 p.

Descriptors: *Radioactivity effects, *Embryonic growth stage, *Salmon, *Water pollution effects, Cytological studies, Nuclear wastes, Strontium radioisotopes, Resistance, Temperature, Fisheries, Fish physiology, Fish diseases.

Eleven papers of this collection describe radiation effect studies at Leningrad University on salmon embryogenesis; 4 papers are by other Russian workers related topics. At 20 microCuries/liter Sr90 in seawater, but not at lower levels, effects were noted that may have a lethal outcome (although effects were not immediately lethal, and impairments in form-shaping processes were insignificant). It is considered that the low temperatures at which salmon embryogenesis occurs may aid cell-repair mechanisms. As the radioactivity of the water increased from 0.06 to 20 microCuries/liter, pathological blood cells increased from 6 to 29%. (See W74-02060 thru W74-02069) (Bopp-ORNL)
W74-02059

ACCUMULATION OF RADIOACTIVE ISOTOPES BY THE DEVELOPING EGGS OF THE ATLANTIC SALMON,
Polyarnyi Nauchno-Issledovatelskii i Proektnyi Institut Morskogo Rybnogo Khozyaistva i Okeanografii, Murmansk (USSR).
V. V. Kosheleva.
Trans from Trudy Polyar Nauch Issled 1971 p 7-15, 8 tab, 10 ref, AEC Translation 7418.

Descriptors: *Atlantic salmon, Nuclear reactors, Nuclear wastes, Radioactivity, Water pollution, Water pollution sources, Water pollution effects, *Radioisotopes, Data collection, Fish, *Radioactivity effects, *Embryonic growth stage, Distribution, Viability, Comparative productivity, Cesium, Strontium.
Identifiers: Cerium, Yttrium.

A study was made of the effect of radioisotopes and the products of nuclear fission for three radioactivity levels. Data were collected on the distribution of activity (in percentage of the total) in the egg membrane, in the fluid of perivitelline space, in the embryonal body and in the yolk. The dynamics of viability of embryos during the incu-

bation period was clarified. It was found that the hatching period for embryos developing in water with radioisotopes lasts a longer time. It was also found that the products of nuclear fission and Ce144 cause greater changes than Cs137 and Sr90 + Y90. (See also W74-02059) (Houser-ORNL)
W74-02060

DEVELOPMENT OF ATLANTIC SALMON EGGS UNDER CONDITIONS OF RADIOACTIVE CONTAMINATION OF WATER BY STRONTIUM-90 - YTTRIUM-90 AND CERIUM--144,
Polyarnyi Nauchno-Issledovatelskii i Proektnyi Institut Morskogo Rybnogo Khozyaistva i Okeanografii, Murmansk (USSR).
I. P. Migalovskiy.
Trans from Trudy Polyar Nauch Issled 1971, p 16-30, 16 fig, 4 tab, 16 ref, AEC Translation 7418.

Descriptors: *Atlantic salmon, *Radioactivity, Water pollution, *Water pollution effects, *Radioisotopes, *Strontium, Embryonic growth stage, Larvae, Fish, Larvae growth stage, Viability, Comparative productivity.
Identifiers: *Yttrium, *Cerium.

A study was made of the effect of radioactive isotopes Sr90 + Y90 (5.10 to the minus 6th power curie/liter, 5.10 to the minus 8th power curie/liter, 5.10 to the minus 10th power curie/liter) and Ce144 (3.10 to the minus 6th power curie/liter, 3.10 to the minus 8th power curie/liter, 3.10 to the minus 9th power curie/liter) on the embryonal development of the Atlantic salmon (Salmo salar L.). The action of the isotopes is manifested in lengthening of the hatching period, appearance of deformed embryos and larvae, in an increased death of eggs and larvae; for Ce144 it begins with a radioactivity level 3.10 to the minus 9th power curie/liter and for Sr90 + Y90 it begins with 5.10 to the minus 10th power curie/liter. In addition, at all Ce144 radioactivity levels up to the stage of onset of gastrulation there is an increased development rate. The dependence of the types of deformities on the specific action of the used isotopes was established. (See also W74-02059) (Houser-ORNL)
W74-02061

SOME DATA ON THE DEPENDENCE OF DOSE EFFECT FOR EGGS OF ATLANTIC SALMON,
Polyarnyi Nauchno-Issledovatelskii i Proektnyi Institut Morskogo Rybnogo Khozyaistva i Okeanografii, Murmansk (USSR).
V. N. Podymakhin.
Trans from Trudy Polyar Nauch Issled 1971 p 31-35, 2 fig, 10 ref, AEC Translation 7418.

Descriptors: *Atlantic salmon, Water pollution, *Radioactivity, *Radioisotopes, *Water pollution effects, Biology, Cytological studies, Embryonic growth stages, Larvae, Fish.
Identifiers: Dose, Dose effect, *Dose effect curve.

A study was made of the dependence of the observed radio-biological effects on dose magnitude. As indices of the radiobiological effect. The mortality of the embryos and larvae and the number of anomalous larvae were used. The constructed dose-effect curves show that the magnitude of the radiobiological effect of beta-radiation for the considered indices is determined by the properties of the radioisotope whose influence was investigated. (See also W74-02059) (Houser-ORNL)
W74-02062

DEVELOPMENT OF FISH EGGS AND THE EARLY PERIOD OF GAMETOGENESIS IN THE EMBRYOS AND LARVAE OF THE ATLANTIC SALMON UNDER CONDITIONS OF RADIOACTIVE CONTAMINATION OF WATER,
Polyarnyi Nauchno-Issledovatelskii i Proektnyi Institut Morskogo Rybnogo Khozyaistva i Okeanografii, Murmansk (USSR).
I. P. Migalovskiy.
Trans from Trudy Polyar Nauch. Issled 1971 p36-52, 1 fig, 5 tab, 16 ref, AEC Translation 7418.

Descriptors: *Atlantic salmon, *Radioactivity, *Radioisotopes, Water pollution, *Water pollution effects, *Strontium, *Fish eggs, Embryonic growth stages, Larvae, Biology, Cytological studies, Variability, Control, Productivity.

Three activity levels of Sr90 + Y90 were used : 2.10 to the minus 5th power, 0.7.10 to the minus 6th power and 0.6.10 to the minus 7th power curie/liter. Stages in development of eggs of the Atlantic salmon prior to closing of the blastopore, formation of the 'tail kidney,' yolk-vitelline circulation and one-day larvae were examined. There was no difference between the control and experimental variants with respect to duration of individual development stages and the length of embryos and larvae. In addition, at the mentioned development times, the number of primary sex cells (PSC) in control and experimental variants were computed. There was a depression in the process of formation of PSC for the experimental variant with an activity of 2.10 to the minus 5th power curie/liter, whereas the number of PBC in the experimental variant with an activity of 0.7.10 to the minus 6th power curie/liter approaches their number in the control and in the variant with 0.6.10 to the minus 7th power curie/liter the number somewhat exceeds the control. (See also W74-02059) (Houser-ORNL)
W74-02063

HISTOGENESIS AND FUNCTIONING OF THE HYPOPHYSIS AND THYROID GLAND IN THE LARVAE OF ATLANTIC SALMON EXPOSED TO IONIZING RADIATION,
Polyarnyi Nauchno-Issledovatelskii i Proektnyi Institut Morskogo Rybnogo Khozyaistva i Okeanografii, Murmansk (USSR).
S. A. Oganesyan.
Trans. from Trudy Polyar Nauch. Issled, 1971. p 53-65, 9 fig, 4 tab, 20 ref, AEC Translation 7418.

Descriptors: Water pollution, Water pollution sources, *Radioactivity, *Atlantic salmon, *Water pollution effect, Embryonic growth stages, Larvae, Cytological studies, *Fish physiology, Biocontrol, Pathology, Marine biology, Biological membranes.
Identifiers: *Radiation effects.

In the thyroid gland of larvae whose embryonal period transpired with chronic exposure to radiation, one can observe characteristic degenerative changes and impairments in release of the secretion. In the hypophysis one can detect growth of the parenchyma, consolidation of nuclei and an increased mitotic activity. Total irradiation in doses of 350 and 1000 R causes phase changes in the thyroid gland, expressed during the first stage in an intensification and later in a depression of secretory activity. (See also W74-02059) (Houser-ORNL)
W74-02064

EFFECT OF STRONTIUM-90 + YTTRIUM-90 ON THE DEVELOPMENT AND FUNCTIONING OF THE HATCHING GLANDS IN ATLANTIC SALMON,
Polyarnyi Nauchno-Issledovatelskii i Proektnyi Institut Morskogo Rybnogo Khozyaistva i Okeanografii, Murmansk (USSR).
S. V. Kasatkina.
Trans from Trudy Polyar Nauch Issled, 1971. p 66-74, 4 fig, 1 tab, 27 ref, AEC Translation 7418.

Descriptors: *Strontium, Water pollution, Water pollution sources, *Radioactivity, *Atlantic salmon, *Water pollution effects, Hatching, *Fish eggs, Embryonic growth stage, Cytological studies, Animal physiology, Variability, Enzymes, Mortality.
Identifiers: *Radiation effects, *Yttrium.

A study was made of the morphophysiological state of the hatching glands in embryos developing under conditions of chronic contamination of water by Sr90 + Y90 (2.10 to the minus 5th power, 0.7.10 to the minus 6th power, 0.6.10 to the minus 7th power curie/liter) and also with a combined exposure Sr90 + Y90 2.10 to the minus 5th power curie/liter + 350 R. No changes in morphology of the hatching glands were discovered in a study of histologic specimens of the head part of experimental embryos. In all the experimental variants the action of the radioisotopes Sr90 + Y90 causes a more intensive enzyme accumulation by the hatching glands, whereas in variants with an activity of 2.10 to the minus 5th power, 0.7.10 to the minus 6th power and 0.6.10 to the minus 7th power curie/liter it leads to earlier onset of hatching in comparison with the control. With a combined exposure of the Atlantic salmon embryo the process of enzyme secretion by the hatching glands is slowed down; this can probably be attributed to the aftereffect of X-irradiation. (See also W74-02059) (Houser-ORNL)
W74-02065

CHANGE IN PERIPHERAL BLOOD IN THE EMBRYOS AND LARVAE OF ATLANTIC SALMON UNDER THE INFLUENCE OF RADIOACTIVE CONTAMINATION OF THE WATER AND X-RAYS,
Polyarnyi Nauchno-Issledovatelskii i Proektnyi Institut Morskogo Rybnogo Khozyaistva i Okeanografii, Murmansk (USSR).
V. V. Kosheleva.
Trans from Trudy Polyar Nauch. Issled, 1971. p 75-88, 1 fig, 4 tab, 17 ref, AEC Translation 7418.

Descriptors: Water pollution, Water pollution sources, Radioactivity, *Strontium, Fish, Mortality, *Atlantic salmon, Electromagnetic waves, *Water pollution effects, Cytological studies, Fish physiology.
Identifiers: *Yttrium, *Red blood, *Radiation effects.

A study was made of the effect of chronic exposure to Sr90 + Y90 of different concentrations on the morphological composition of the red blood of Atlantic salmon embryos and larvae. In the egg blastula stage in the aquarium with Sr90 + Y90 with an activity of 2.20 to the minus 5th power curie/liter there was additional irradiation by X-rays in a dose of 350 R. It was established that a characteristic manifestation of the action of Sr90 + Y90 is a considerable depression in the rate of maturing of formed blood elements and the appearance of cells with different morphological changes. The degree of the radiation effect increases with an increase in the radioactive isotope in the water. With a combined exposure there was no additional changes with respect to the variant with Sr90 + Y90 (2.10 to the minus 5th power curie/liter). (See also W74-02059) (Houser-ORNL)
W74-02066

CHRONIC EFFECT OF STRONTIUM-90 + YTTRIUM-90 ON THE FREQUENCY OF CHROMOSOMAL ABERRATIONS IN THE EMBRYONAL CELLS OF THE ATLANTIC SALMON,
Polyarnyi Nauchno-Issledovatelskii i Proektnyi Institut Morskogo Rybnogo Khozyaistva i Okeanografii, Murmansk (USSR).
V. N. Migalovskaya.
Trans from Trudy Polyar Nauch. Issled, 1971. p 89-99, 1 fig, 6 tab, 13 ref, AEC Translation 7418.

Descriptors: *Atlantic salmon, *Embryonic growth stage, Larvae, *Radioactivity, Water pollution, *Water pollution effects, *Strontium, Water pollution sources, Cytological studies, Fish, Animal physiology, Chromosomes, Variability.
Identifiers: *Radiation effects, *Yttrium.

Three radioactivity levels for Sr90 + Y90 were used : 2.10 to the minus 5th power curie/liter, 0.7.10 to the minus 6th power curie/liter and 0.6.10 to the minus 7th power curie/liter. Developing embryos of the Atlantic salmon were investigated in the stages of the blastometric and epithelial blastula, gastrula, and also at the age of one-day larvae. The criteria for the radiation effect were the mitotic index and the frequency of chromosomal aberrations. Temporary specimens stained with acetocaraine were investigated. No decrease in the percentage of dividing cells was detected in the investigated development stages. In variants with a radioactivity level of 2.10 to the minus 5th power curie/liter and in a combined exposure there was a reliable increase in the frequency of chromosomal aberrations, beginning with the epithelial blastula stage. A great diversity of types of chromosomal aberrations was noted: individual bridges, fragments, multiple bridges, presence in the cell of several fragments, multipolar mitoses, and formation of micronuclei. (See also W74-02059) (Houser-ORNL)
W74-02067

EFFECT OF X-IRRADIATION ON THE GAMETES AND EMBRYONAL CELLS OF THE ATLANTIC SALMON,
Polyarnyi Nauchno-Issledovatelskii i Proektnyi Institut Morskogo Rybnogo Khozyaistva i Okeanografii, Murmansk (USSR).
V. N. Migalovskaya.
Trans. from Trudy Polyar Nauch. Issled, 1971. p 100-112, 2 fig, 8 tab, 12 ref, AEC Translation 7418.

Descriptors: *Atlantic salmon, *Embryonic growth stages, *Chromosomes, Fish eggs, *Cytological studies, *X-rays, Animal physiology, Metabolism, Marine fish.
Identifiers: *Radiation effects, Fertilization, Sperm, Radiation damage.

A study was made of the influence of small radiation doses (50, 150, and 350 R) on the fertilizing capacity of spermia and on the frequency of chromosomal aberrations in the cells of Atlantic salmon embryos in the blastula and gastrula stages. These radiation doses did not cause an appreciable decrease in the fertilizing capacity of the spermia. The percentage of fertilization in the control and in all experimental variants was at the same level. The criterion for radiation damage to the nucleus was the frequency of the late anaphases with bridges and fragments. Statistically reliable differences were obtained for the frequency of chromosomal aberrations in all the studied stages of development between the control and the 350-R variant. Radiation damage to the nuclear apparatus persisted at approximately the same level during embryogenesis of the Atlantic salmon. No decrease in mitotic activity was noted during the studied development stages. With irradiation of the dividing egg in the blastula stage in a dose of 350 R there was a temporary lag in mitotic divisions and also an increase in the frequency of chromosomal aberrations. The chromosomal aberrations were represented for the most part by individual bridges and fragments. Multiple bridges and multipolar mitoses were encountered in individual cells. (See also W74-02059) (Houser-ORNL)
W74-02068

RADIOMETRIC AND DOSIMETRIC CHARACTERISTICS OF EXPERIMENTS FOR DETERMINING THE INFLUENCE OF RADIOACTIVITY OF A WATER MEDIUM ON THE DEVELOPMENT OF EGGS OF THE ATLANTIC SALMON,
Polyarnyi Nauchno-Issledovatelskii i Proektnyi Institut Morskogo Rybnogo Khozyaistva i Okeanografii, Murmansk (USSR).
V. N. Podymakhin.
Trans. from Trudy Polyar. Nauch. Issled., 1971. p 113-133, 5 fig, 8 tab, 12 ref, AEC Translation 7418.

Descriptors: *Atlantic salmon, *Water pollution, *Radioactivity, *Radioactivity effects, *Water pollution effects, *Fish eggs, Cytological studies, Embryonic growth stages, Marine fish, Strontium.
Identifiers: Eggs, Yttrium.

A detailed study was made of the methodological characteristics and specific results of measurements of the radioactivity of the eggs (and their individual components) of the Atlantic salmon. The material was obtained in an experiment with the incubation of eggs in aquaria with water contamination by Sr90 + Y90, Co144 + Pr144 and Cs137 at the Ura-Guba Fish Hatchery during the period from October 1966 through June 1967. On the basis of radiometric data, the absolute values of some characteristics of the natural dose fields and radiation loads on eggs in aquaria with radioactive contamination of the water were determined. These load values determine the degree of the radiobiological effect of the isotopes in the water on the fish eggs. (See also W74-02059) (Houser-ORNL)
W74-02069

POLYCHLORINATED BIPHENYL RESIDUES IN HUMAN PLASMA EXPOSE A MAJOR URBAN POLLUTION PROBLEM,
National Environmental Research Center, Research Triangle Park, N.C.
For primary bibliographic entry see Field 05B.
W74-02078

EFFECT OF WATER DEPTH ON THE INFECTION OF BIOMPHALARIA GLABRATA BY MIRACIDIA OF ST. LUCIAN SCHISTOSOMA MANSONI UNDER LABORATORY AND FIELD CONDITIONS,
E. S. Upatham.
J Helminthol. Vol 46, No 4, p 317-325. 1972. Illus.
Identifiers: *Biomphalaria-Glabrata, *Miracidia, *Schistosoma-Mansoni, St-Lucian, Water depth, *West Indies.

Laboratory and field trials were carried out to investigate the influence of depth on the infection of B. glabrata by St. Lucian S. mansoni miracidia. In both laboratory and field experiments, miracidia located and infected snails to a depth of 122 cm. The degree of infection seems to be related to the size of a habitat and its water volume. Infection rates were high at the miracidial point of entry where miracidium-snail interaction was maximum and at the water surface where miracidia eventually congregated. In none of the experiments was there evidence that biological buffering affected the snail infection rates. Miracidia were more efficient in locating and infecting snails when they were released into the bottom than onto the top of a habitat. In natural St. Lucian habitats, West Indies, depths rarely exceed 61 cm, and so any snails present will be exposed to infection irrespective of where they are in a habitat or the depth at which the S. mansoni eggs hatch.--Copyright 1973, Biological Abstracts, Inc.
W74-02097

EFFECTS OF SOME PHYSICO-CHEMICAL FACTORS ON THE INFECTION OF BIOMPHALARIA GLABRATA (SAY) BY MIRACIDIA OF SCHISTOSOMA MANSONI SAMBON IN ST. LUCIA, WEST INDIES,
E. S. Upatham.
J Helminthol. Vol 46, No 4, p 307-315. 1972. Illus.
Identifiers: Biomphalaria-Glabrata, Infection, *Miracidia, Physicochemical studies, *Schistosoma-Mansoni, *West Indies (St. Lucia).

Four physico-chemical charac teristics of water volume, salinity, pH and turbidity were each found to affect infection of B. glabrata by S. mansoni miracidia. The rate of infection decreased as the water volume increased, from 90.6%-0.005 l to 47.5% at 50 1. The rate of infection decreased as NaCl concentration increased, from 78.7% at 0.5 ppm to 2.1% at 4200 ppm. Above 4200 ppm no infection occurred. The activity of the miracidia was affected above 1200 ppm. The snails become nonmotile at above 4800 ppm and died within 16 hr at higher concentrations. The infection rate was zero at pH 4, very low at pH 5 and 10, and highest at pH 7-9, with a peak at pH 8. Snails tolerated all pH levels tested. Miracidia were active for 1-2 min at pH 4, 5-10 min at pH 3, 3 hr at pH 6, 5-6 hr at pH 7-9, and 2 hr at pH 10. The rate of infection decreased sharply as turbidity increased from zero ppm-100 ppm, but then decreased slowly from 100 ppm-500 ppm. No adverse effect of turbidity on snails was detected within 1 hr. Although the physico-chemical characteristics of natural St. Lucian waters do not prevent the infection of B. glabrata by S. mansoni miracidia, naturally occurring values of certain factors may reduce the chance of snails becoming infected.--Copyright 1973, Biological Abstracts, Inc.
W74-02098

EXPOSURE OF CAGED BIOMPHALARIA GLABRATA (SAY) TO INVESTIGATE DISPERSION OF MIRACIDIA OF SCHISTOSOMA MANSONI SAMBON IN OUTDOOR HABITATS IN ST. LUCIA,
E. S. Upatham.
J Helminthol. Vol 46, No 4, p 207-306. 1972. Illus.
Identifiers: *Biomphalaria-Glabrata, Dispersion, Exposure, Habitats, *Miracidia, *Schistosoma-Mansoni, *West Indies (St. Lucia).

Laboratory studies showed 2 types of cages to be suitable for exposing unifected B. glabrata in field habitats as a means of locating S. mansoni miracidial infestations. Tests conducted in tanks under simulated field conditions showed that miracidia moved away from the point of inoculation in non-random fashion and congregated at the margins of the tanks. In a natural habitat, miracidia located and infected caged snails at distances of 33 cm vertically and 106.7 cm horizontally. The pattern of infection was similar in the simulated field and field experiments, but field infection rates were lower. For transmission studies in field habitats, caged laboratory-bred snails should be placed at the margin of the habitat to ensure the maximum snail-miracidium interaction.--Copyright 1973, Biological Abstracts, Inc.
W74-02099

AGE, GROWTH AND MORTALITY OF THE WHITE PERCH, MORONE AMERICANA, IN THE JAMES AND YORK RIVERS, VIRGINIA,
Virginia Inst. of Marine Science, Gloucester Point.
R. A. St. Pierre, and J. David.
Chesapeake Sci. Vol 13, No 4, p 272-281. 1972. Illus.
Identifiers: Age, Growth, Morone-Americana, *Mortality, Rivers, *Virginia, *White perch.

More than 800 white perch, M. americana, were collected from each of 2 major tributaries of southern Chesapeake Bay to compare age structures, growth and mortaility rates. The James River is characterized by heavy domestic and industrial pollution in several tributaries and segments, whereas the York River is only slightly polluted. Maximum ages determined by scale analysis were 7 and 10 yr for males and females in both rivers. Yearling perch in the York River appeared to have a significantly greater mean length than those from the James but this difference is largely due to sampling bias. Both sexes of white perch from the James River were significantly larger than perch from the York River at ages II and III. However, mean lengths of white perch from age groups IV and older were not significantly different between rivers for either sex. In both rivers females were significantly longer (to age V) and heavier (all ages) than males of comparable age. Yearly growth increments were greatest early in life. All yr calsses of white perch followed a similar growth pattern during their first yr in both

estuaries. However, for later yr of life earlier yr classes apparently had a greater mean length than those from more recent yr at comparable ages. Males were more abundant than females for the first 3 yr of life in both rivers, however, females were present in significantly greater numbers in all older age groups. Analysis of relative age frequency suggested dominant yr classes in 1964 and 1965 in the James River, and weak yr class in 1968. No dominant yr classes were apparent from the York River collections. Mortality rates were calculated from age frequency distributions. Total annual mortality in the James River was about 69% for males after age IV and for females after age VI. In the York River, males at age III and older die at a rate of 59%, whereas females older than age V have an annual mortality of 57%.--Copyright 1973, Biological Abstracts, Inc.
W74-02101

EFFECT OF NITRILOTRIACETIC ACID ON GROWTH AND MATING IN STRAINS OF ESCHERICHIA COLI K-12,
G. J. Stine, and A. A. Hardigree.
Can J Microbiol. Vol 18, No 7, p 1159-1162. 1972.
Identifiers: Coli K-12, Growth, Mating, *Nitrilo triacetic acid, Strains.

The effect of nitrilotriacetic acid (NTA), a possible substitute for phosphates in detergents (and possible environmental pollutant) was studied on strains of E. coli K-12. No nutagenic effect was observed, but inhibition of growth and recombinant formation with increasing concentrations of NTA occurred. NTA also induced abnormal cell morphology and yellow pigmentation in colonies.--Copyright 1973, Biological Abstracts, Inc.
W74-02102

DETERMINATION OF VITAMIN B12, THIAMINE AND BIOTIN IN LAKE TAHOE WATERS USING MODIFIED MARINE BIOASSAY TECHNIQUES,
California Univ., San Diego, La Jolla. Inst. of Marine Resources.
A. F. Carlucci, and P. M. Bowes.
Limnol Oceanogr, Vol 17, No 5, p 774-776, 1972.
Identifiers: Amphidinium-carterae, *Biotin, California, Cyclotella-nana, Lakes, Monochrysis-lutheri, Nevada, *Thiamine, *Vitamin B-12, *Lake Tahoe, *Algae bioassay.

Seawater bioassays for dissolved vitamin B12, thiamine and biotin were modified for freshwater samples. The assay algae are: B12, Cyclotella nana; thiamine, Monochrysis lutheri; and biotin, Amphidinium carterae. The lowest detectable levels of dissolved vitamins are: B12, 0.1 ng/l; thiamine, 4 ng/l; and biotin, 0.4 ng/l. Summer and winter samples in a water column near the center of Lake Tahoe, California, were assayed using this method, and, with one exception, vitamins were found only in the euphotic zone.--Copyright 1973, Biological Abstracts, Inc.
W74-02118

PHOSPHORUS AND ALGAL GROWTH IN THE SPOKANE RIVER,
Washington State Univ., Pullman. Dept. of Sanitary Engineering.
R. J. Condit.
Northwest Sci. Vol 46, No 3, p 177-189. 1972. Illus.
Identifiers: *Algal, Growth, *Bioassay, Blooms, Growth, Nitrogen, *Phosphorus, Productivity, Rivers, Runoff, Selenastrum-Capricornutum, Water pollution effects, *Washington (Spokane River), *Chlorophyta.

The green algal form, Selenastrum capricornutum, proved to be an adequate and responsive test organism for natural water bioassays when properly acclimated. The growth parameters obtained from control flasks indicate that during the test periods, the total productivity and algal growth rates in the natural waters increase as the river progresses through the city. During the spring, high runoff provided adequate nutrients to promote algal growth in bloom proportions. The large biomass reduced P concentrations to limiting levels in the river. The especially high algal production in the lower river was due in part to the added P made by the wastewater treatment plant above the Bowl and Pitcher Bridge. Dissolved orthophosphate levels at this station were sufficiently high to cause inhibition to algal growth rates when additional P was introduced in the bioassay. The Aug. bioassay indicated that productivity was governed by factors other than limiting concentrations of P. Nitrogen was found to be limiting in Porcupine Bay, while Mg appeared to be a limiting factor in Sullivan Road waters.--Copyright 1973, Biological Abstracts, Inc.
W74-02143

5D. Waste Treatment Processes

WATER POLLUTION BY DAIRY FARM WASTES AS RELATED TO METHOD OF WASTE DISPOSAL,
Auburn Univ., Ala. Dept. of Animal and Dairy Science.
For primary bibliographic entry see Field 05B.
W74-01651

ENVIRONMENTAL DISTRIBUTION AND METABOLIC FATE OF KEY INDUSTRIAL POLLUTANTS AND PESTICIDES IN A MODEL ECOSYSTEM,
Illinois Univ., Urbana. Dept. of Entomology.
R. L. Metcalf, P-Y Lu, and I. P. Kapoor.
Available from National Technical Information Service as PB-225 479/5 in paper copy; $1.45 in microfiche. Illinois Water Resources Center Research Report No 69, June 1973, 80p, 15 fig, 28 tab, 37 ref, append. OWRR B-050-ILL (1), 14-31-0001-3273.

Descriptors: Ecosystems, *Industrial wastes, Model studies, *Food chains, Solubility, Toxicity, *Pesticides.
Identifiers: *Radiolabeled contaminants, Food chain organisms, *Biodegradability index, Plasticizers, Partition coefficient, Screening pollutants, *Ecological magnification.

The contamination of water supplies with toxic substances liberated into the environment either accidentally as industrial or household wastes or purposefully as pesticides and food additives is an important problem in environmental quality. Radiolabeled contaminants used in a laboratory model ecosystem provide an elegant method for determining the degradative fate of potential pollutants, indications of their toxic effects to a variety of food chain organisms, and measurement of their ecological magnification in food chain organisms. More than 30 important organic chemicals including raw materials, plasticizers, heat exchange fluids, insecticides, and herbicides have been evaluated as radiotracers in such a model ecosystem with a seven element food chain. The results have been expressed in terms of ecological magnification and biodegradability index, and have been examined for correlation with such physio-chemical properties as water solubility, and partion coefficient, and for relationships to electron distribution. The model ecosystem technology provides a simple and informative screening technique for detecting potential environmental pollutants and for selecting approximately biodegradable molecules for industrial development.
W74-01655

METHODOLOGIES FOR FLOW PREDICTION IN URBAN STORM DRAINAGE SYSTEMS,
Illinois Univ., Urbana. Dept. of Civil Engineering.
B. C. Yen.
Available from the National Technical Information Service as PB-225 480/3, $4.75 in paper copy, $1.45 in microfiche. Illinois Water Resources Center Research Report No. 72, 1973. 150 p, 41 fig, 8 tab, 92 ref, 11 append. OWRR B-043-ILL (8), 14-31-001-3078.

Descriptors: Drainage, *Drainage systems, Effluents, Waste water (Pollution), Flood routing, Flow characteristics, Hydraulics, *Hydraulic design, Hydrographs, *Mathematical models, *Open-channel flow, Overland flow, *Risks, Runoff, Safety factors, *Storm water, *Unsteady flow, *Urban runoff, Equations, Sewers, Simulation analysis.
Identifiers: St. Venant equations.

An urban storm drainage system can be considered as an integrated system of components of urban surface, gutters, inlets, sewers branches, junctions, manholes, and other facilities. In this study the flow equations that can be used to solve storm drainage problems are critically reviewed and the mathematical methods for solving the St. Venant equations are compared. A method for routing the unsteady flow due to rainfall and other inputs through land surface and gutter to produce the inlet hydrograph is proposed. The results have been presented in non-dimensional form for general use. A mathematical simulation model for tree-type sewer networks is developed for flow prediction and design by using the St. Venant equations to route the inlet hydrographs through the network. An overlapping segment scheme is used to account for the backwater effects and mutual influences of the unsteady flow in the sewers. Furthermore, new approaches based on risk consideration are proposed for determination of design rainfall and for design of sewers and other hydraulic structures.
W74-01656

SEPTIC SYSTEMS: EFFECTS OF SURFACE AND SUBSURFACE WATER,
Lake County Health Dept., Waukegan, Ill.
For primary bibliographic entry see Field 05B.
W74-01716

A LITERATURE REVIEW ON THE BIOLOGICAL PURIFICATION METHODS OF SEWAGE IN CHEMICAL-PHARMACEUTICAL PLANTS, (IN RUSSIAN),
Moskovskii Inzhenerno-Stroitelnyi Institut (USSR).
T. A. Karyukhina, S. A. Klein, G. A. Shangina, L. V. Yangolenko, and L. Z. Krzhapol'skaya.
Khim-Farm Zh. Vol 5, No 11, p 30-35, 1971.
Identifiers: *Biological treatment, *Literature review, Methods, Pharmaceutical plants, Reviews, *Sewage treatment, Water purification, *Waste water treatment.

The following points were stressed: it is essential to neutralize the sewage; sewage should be exposed to biologic oxidation in aerobic, as well as anaerobic conditions; the multistep purification seems promising in combinations, air tank-biofilter, and biofilter-biofilter; and sewage purification in most cases has been insufficient according to sanitary requirements. Extensive experimental studies are recommended, since technical literature has shown that this problem can be solved satisfactorily.--Copyright 1973, Biological Abstracts, Inc.
W74-01756

BOISE METROPOLITAN AREA SANITARY SEWAGE COLLECTION AND TREATMENT FACILITIES: PHASE II REPORT.
J-U-B Engineers, Inc., Boise, Idaho; and Barton, Stoddard, Milhollin and Higgins, Boise, Idaho.

Prepared for ADA Council of Governments, Boise, Idaho. ACOG Environmental Planning Report 1. March 1, 1973. 138 p, 18 fig, 1 append.

Descriptors: *Sewage treatment, *Sewers, *Idaho, Sewerage, Septic tanks, Biochemical oxygen demand. Costs, *Treatment facilities, Waste water treatment.
Identifiers: *Sewage collection, *Boise (Idaho).

Boise, Idaho has a present population of 97,000 and will grow to 165,000 by 2000. Rapid growth has produced a proliferation of septic tanks, which may eventually produce health hazards. Other problems are overloading of sewer lines due to groundwater infiltration and need for additional treatment as a result of lower summer flows on the Boise River and a maximum daily loading standard of 2000 pounds set by the State Department of Environmental Protection and Health. Secondary treatment will be adequate to meet the new standards. Originally, two sewerage plans were presented in November, 1972, but the ADA Council of Governments adopted a compromise known as the 'General Plan' presented herein. First priority for construction is urged for upgrading the existing five treatment plants and extending mains into the immediately adjacent areas. Second priority should be given to trunk line capacity, mains, and additional treatment capacity for specified neighborhoods. A new downstream treatment facility will be built on Eagle Island in the Boise River. Two existing treatment plans will be phased out. Recommendations are made for possible pretreatment of industrial wastes before discharge into the public waste collection system. It is recommended that the possibility of future tertiary treatment by spray irrigation should be investigated. The plan advanced by this study is judged to be adequate for twenty years. Attention is given to costs and financing. (Stein-North Carolina)
W74-01854

SEWAGE FARMING,
Washington Univ., St. Louis, Mo., Center for the Biology of Natural Systems.
J. Allen.
Environment. Vol 15, No 3, p 36-41, April, 1973. 2 fig, 1 tab.

Descriptors: *Sewage treatment, *Filtration, *Experimental farms, *Irrigation, *Fertilization, Waste water treatment, *Water reuse, Phosphorus, Nitrate, Saline deposits, Heavy metals.
Identifiers: *Sewage farming, Soil saturation, Salinization, Chicago.

Fertilization of crops with sewage was a nineteenth century European practice which purified the sewage as it filtered through soil. Sewage farming is investigated here for its contemporary American potential. The most comprehensive American experiment in sewage farming has been conducted at Pennsylvania State University. Initial observations showed that as wastewater trickled through the first 12 inches of soil, nitrate concentrations in the water were reduced 68 to 82%, phosphate concentrations were reduced 99%, and organic nitrogen was reduced 68 to 82%. No coliform bacteria were found after three feet of percolation. Plots irrigated with sewage produced greater yields than control plots fertilized conventionally, and equal yields with plots fertilized and irrigated by conventional means. Irrigation by sewage can only work in soils permeabile enough to absorb effluent and natural precipitation without becoming saturated and depleted of oxygen. Timing of sewage applications effects degree of saturation. Salts and heavy metals (especially copper, zinc, and boron) may accumulate in sewage-irrigated soils, but periodic freshwater flushing or control of discharges into sewers might alleviate these problems. Dangers of crop contamination are discussed. The Israeli Ministry of Health indentifies crops which may be safely grown with primarily treated sewage. Cost estimates by the Corps of Engineers in 1972 show land treatment of sewage on Indiana farmland to be the least expensive means of wastewater treatment for the Chicago area. Long-term effects of sewage irrigation on soil are undetermined. (Stein-North Carolina)
W74-01863

WATER RESOURCE PRESERVATION BY PLANNED RECYCLING OF TREATED WASTEWATER,
Culp, Wesner, Culp-Clean Water Consultants, Corona Del Mar, Calif.
G. L. Culp, R. L. Culp, and C. L. Hamann.
Journal of the American Water Works Association, Vol 65, No 10, p 641-647, October, 1973. 3 fig, 5 tab.

Descriptors: *Tertiary treatment, *Water reuse, *Waste water treatment, *Potomac River, Low flow, *Recycling, Viruses, Heavy metals, Nutrients, Water supplies, Maryland, Virginia, District of Columbia.
Identifiers: Trace organics, Urban water supplies, Washington metropolitan area.

Controlled indirect reuse of water has been proposed in the Washington, D.C. metropolitan area to solve an impending water shortage. Advanced wastewater treatment facilities are being considered for most of Montgomery County, which draws its water supply from and discharges its treated wastewater into the Potomac River. The Virginia State Water Control Board has also recommended a regional sewage collection system and advanced wastewater treatment plant for the Occoquan watershed in Fairfax and Prince William Counties. Water demands in both Montgomery County and the Occoquan watershed exceed available safe yields from water supplies at low flow periods. Export of treated wastewater is therefore viewed as a waste of a resource. Treatment processes for advanced wastewater treatment plants in the two areas are graphically illustrated. Controlled indirect reuse of wastewater differs from uncontrolled indirect reuse in that the latter is the traditional practice of discharging secondarily-treated wastes into surface waters and treating the surface water for consuption downstream, while the former anticipates reuse and thoroughly treats waste before discharge. Controlled direct reuse differs from controlled indirect reuse in that with direct reuse, water is recycled for consuption without first being discharged into surface waters. Removal of viruses, heavy metals, trace organics, and nutrients by advanced wastewater treatment is discussed. (Stein-North Crolina)
W74-01866

NORTH LOOKS AT WASTE WATER CLEANUP NEEDS.

Environmental Science and Technology, Vol 7, No 11, p 998-999, November, 1973. 2 fig.

Descriptors: *Sewage treatment, *Cold regions, Cold weather construction, *Permafrost, *Arctic, *Subarctic, Aeration, Chlorine, Lime, Hydrogen ion concentration, Alaska, Canada, *Waste water treatment, Waste treatment.
Identifiers: Psychrophilic bacteria, Aqua Nuchar A-powered carbon, Granular carbon, Vacuum sewage collection.

Sub-Arctic and Arctic regions have particular waste treatment problems due to the extremely cold climate. These problems require unique technology for solution. Freezing of wastes by permafrost can retain disease-producing organisms for a long time. Few biological filters exist in very cold climates. Consequently, chemical treatment is substituted. Aeration treatment of wastes has been successfully used in the Soviet Union, Manitoba, and Alaska. Tests in Brandon, Manitoba showed that aeration over a 24-hour period reduced coliform to acceptable levels. The Army Cold Region Research Evaluation Laboratory has developed a single tank extended aeration secondary treatment system which is applicable to permafrost regions at lower costs than other systems. Industrial wastes from a sulfite pulp and paper factory have successfully been combined with municipal wastes and treated, so long as proper BOD-nutrient ratios were maintained. Interest in psychrophilic, or cold temperature bacteria has grown; experiments show that the percentage of psychrophiles in sludge samples increases dramatically as temperature decreases. Research on nonbiological treatment methods involving Aqua Nuchar A-powered carbon and granular carbon is reported. Studies of effects of the addition of lime to sludge have proven temperature a less significant factor for disinfection than pH. Chlorine appears less effective for disinfection at low temperatures than at moderate temperatures. An experimental vacuum sewage collection system has proven relatively inexpensive where gravity sewers are difficult to construct. Such a system would drastically reduce the amount of wastewater needing treatment. (Stein-North Crolina)
W74-01868

COALESCING PLATES AND PACKS FOR OIL WATER SEPARATION IN VARIOUS SHIPBOARD APPLICATIONS,
General Electric Co., Philadelphia, Pa. Re-entry and Environmental Systems Div.
For primary bibliographic entry see Field 05G.
W74-01882

THE REMOVAL OF TOXIC METALS FROM WATER BY REVERSE OSMOSIS,
Research Triangle Inst., Durham, N.C.
F. O. Mixon.
Available from the National Technical Information Service as PB-223 449, $3.00 in paper copy, $1.45 in microfiche. Office of Saline Water Research and Development Progress Report 889, September 1973. 43 p, 1 fig, 37 tab. OSW Contract 14-30-3064.

Descriptors: *Membrane processes, *Reverse osmosis, *Pilot plants, *Desalination, Desalination processes, Water treatment, Metals, Toxicity, Sewage Effluents, *Brackish water, *Metals, Cadmium, Barium, Lead, Chromium, Copper, Zinc.
Identifiers: Cellulose acetate membranes, Polyamide membranes.

Experimental bench scale studies were carried out with cellulose acetate and polyamide reverse osmosis membranes to establish rejection efficiencies for different metallic contaminants including barium, cadmium, zinc, copper, chromium and lead. These tests were conducted with trace levels of these metallic contaminants, singly and in combination and at different concentrations, while desalting potable water, various wastewaters and brackish waters. Except for copper in wastewater, metallic removal efficiencies of about 90% or greater were experienced. It was concluded that reverse osmosis may be effectively applied in the production of potable water where the raw water contains trace amounts of the various metals considered in this study. Reverse osmosis may also prove useful where sewage treatment plant effluent has residual trace metal content. (OSW)
W74-01906

TESTING REVERSE OSMOSIS MODULES FOR WASHWATER RECYCLING,
Abcor, Inc. Cambridge, Mass.
R. L. Goldsmith, S. Hossain, and M. Tan.
Available from the National Technical Information Service as PB-223 195 $8.00 in paper copy, $1.45 in microfiche. Office of Saline Water Research and Development Progress Report 877, June 1973. 111 p, 17 tab, 12 fig, 5 ref. OSW Contract 14-30-3158.

Descriptors: *Reverse osmosis, *Membrane Processes, Membranes, *Semipermeable membranes, *Water treatment, Permselective Membranes, Filtration, Permeability, Separation techniques, Water Purification, Water quality, *Recycling, Desalination.
Identifiers: *Washwater purification, Polybenzimidazole hollow fibers, Cellulose acetate blend, Sulfonated polyphenylene oxide, Salt rejection, Membraneflux, Membrane testing, Reverse osmosis test loop.

Three membrane modules were evaluated for concentration of washwater at 165F. The objective was to provide data upon which OSW could base a recommendation for further development of membranes for use in spacecraft missions. The membranes testes were: polybenzimidazole (PBI) (hollow fiber configuration); cellulose acetate (CA) blend (spiral wound confiruration); and sulfonated polyphenylene oxide (PPO) (plate-and-frame configuration). Tests were conducted both with a synthetic washwater which contained ABS, urea, lactic acid, and sodium chloride, and with simulated (real) washwater. The results are summarized in tabular form. (OSW)
W74-01924

INTERACTION OF FEEDWATER COLLOIDS WITH THE SURFACE OF REVERSE OSMOSIS MEMBRANES,
Gulf Environmental Systems Co., San Diego, Calif.
E. E. Bevege, J. E. Cruver, J. G. Kilbride, S. S. Kremen, and A. B. Riedinger.
Available from NTIS as PB-223 193 $8.00 in paper copy, $1.45 in microfiche. Office of Saline Water Research and Development Progress Report 883, July 1973. 111 p, 42 fig, 40 tab, 37 ref. OSW Contract 14-30-1086.

Descriptors: *Reverse osmosis, *Colloids, Humic acids, Permeability, *Filtration, Membranes, Membrane processes, Separation techniques, Sewage treatment, *Waste water treatment, Clays.
Identifiers: Feedwater colloids, Ultrafiltration, Feedwater-surface interactions, Membrane permeability decline, Membrane fouling, Streaming current, Sequestering agents.

The fouling of reverse osmosis modules was studied under very carefully controlled conditions. A pilot reverse osmosis unit was run 'open loop,' and the modules were placed in parallel. Surface waters were simulated by mixing various combinations of humic acid, salts, and clay. Membrane of three different permeabilities was used. Pressure adjustment gave constant permeate flow. The measurement of apparent streaming current provided data on neutralization of charge and consequently on coagulation as distinct from precipitation. It was thus a measure of colloidal stability. Eight runs were made in the unit, based on the laboratory findings and using different feeds. This led to the postulation of two different fouling mechanisms. The first of these is the effect of acidity and cation concentration on stability of humic acid solutions as the pH was lowered and cation concentration, especially Polyvalent cation concentration, increased. A second mechanism was the interaction between humic acid and clay. Two different methods for prevention of fouling were studied: sequestration of cations and coagulation of organics followed by filtration. (OSW)
W74-01925

A METHODOLOGY FOR DETERMINING OPTIMAL LONGITUDINAL SPACING OF EFFLUENT DISCHARGES INTO A RIVER,
Massachusetts Univ., Amherst. Dept. of Industrial Engineering and Operations Research.
For primary bibliographic entry see Field 05B.
W74-01928

MULTI-TIME PERIOD FACILITIES LOCATION PROBLEMS: A HEURISTIC ALGORITHM WITH APPLICATION TO WASTE WATER TREATMENT SYSTEMS,
Massachusetts Univ., Amherst. Dept. of Industrial Engineering and Operations Research.
H. S. Bhalla, and R. F. Rikkers.
Available from the National Technical Information Service as PB-225 697 $7.00 in paper copy, $1.45 in microfiche. Massachusetts Water Resources Research Center, Amherst, Publication No 21, 1971. 87 p, 6 fig, 5 tab, 23 ref. OWRR B-011-MASS (8).

Descriptors: *Waste water treatment, *Mathematical models, *Linear programming, *Cost analysis, Transportation, Construction, *Treatment facilities, Sites.
Identifiers: *Algorithms.

A multi-time period, facilities location problem with fixed charges on the facilities and the supply routes and variable facility operating cost and transportation cost is studied. The problem originally arose in the contest of regional waste water treatment systems. A heuristic approach is taken to arrive at a 'good' solution without an exhorbitant expenditure of computer time. The problem is separated into two parts. Expansion of a facility is not allowed in the first part. This constraint is removed in the second part and an optimal building strategy, using existing algorithms, may be obtained independently for each facility built in the first part. A heuristic algorithm, having three phases, is developed for the problem of the first part. A most central facility location, relative to the unallocated demand center is defined in the first phase. The solution obtained is checked for any possible advantage to be gained by dropping some of the facility locations in the solution and reassigning the demand points allocated to them to the remaining locations in the solution. In the second phase, depending upon allocations in the first phase, the demand centers are divided into two groups, fixed and free. An attempt is made to profitably assign the free demand centers to some of the facility locations not in the solution. This phase is terminated when no such assignment can be made. The solution obtained at the end of this phase is the final solution set. In the third phase, an attempt is made to delay the initial building time of facilities at some locations so as to realize a less expensive solution.
W74-01929

THE WRIGHTSVILLE BEACH, NORTH CAROLINA, PILOT PLANT TESTING PROGRAM TO EVALUATE SEA WATER PRETREATMENT METHODS FOR REVERSE OSMOSIS PLANTS,
Stone (Ralph) and Co., Inc., Los Angeles, Calif.
For primary bibliographic entry see Field 03A.
W74-01931

THE CHULA VISTA, CALIFORNIA, PILOT PLANT TESTING PROGRAM TO EVALUATE SEA WATER PRETREATMENT METHODS FOR REVERSE OSMOSIS,
Stone (Ralph) and Co., Inc., Los Angeles, Calif.
For primary bibliographic entry see Field 03A.
W74-01932

USE AND CONSERVATION OF WATER RESOURCES IN THE UKRAINE (ISPOL'ZOVANIYE I OKHRANA VODNYKH RESURSOV V UKRAINSKOY SSR),
N. A. Garkusha.
Vodnyye Resursy, No 3, p 13-17, 1972.

Descriptors: *Water resources, *Water utilization, *Water conservation, Water supply, Water pollution, *Water pollution control, Water quality control, Water management (Applied), Irrigation practices, Irrigation systems, Return flow, *Water reuse.
Identifiers: *USSR (Ukraine).

The Central Committee of the Communist Party of the Ukraine and the Council of Ministers of the Ukrainian SSR have recently adopted a number of resolutions aimed at rational use of water in the Republic and at radical improvement in its protection from contamination and depletion. Per capita water resources in the Ukraine are 1,100 cu m a year or 15 times less than those for the USSR as a whole. Only three Union Republics have less adequate water supplies--Turkmenistan, Moldavia, and Uzbekistan. Water shortage problems occur in the Donets Basin, Krivoy Rog region, the Crimea, and in the Chernovtsy and other oblasts, and virtually all water resources of the Severskiy Donets, Dniester, and Southern Bug Rivers are fully utilized. Reference is made to operation of the 23,300-hectare Bortnichskaya irrigation system in Kiev as the largest and most efficient system of wastewater irrigation in the Ukraine, and present and future problems of water supplyin the Republic are discussed. (Josefson-USGS)
W74-01971

SUBSURFACE QUALITY TRANSFORMATIONS DURING THE INITIATION OF A NEW STABILIZATION LAGOON,
Arizona Univ., Tucson. Water Resources Research Center.
L. G. Wilson, W. L. Clark, III, and G. G. Small.
Water Resources Bulletin, American Water Resources Association, Vol 9, No 2, p 243-257, April 1973. 3 fig, 3 tab, 15 ref. OWRR A-025-ARIZ (5). 14-31-0001-3503.

Descriptors: *Oxidation lagoons, Seepage, Deep percolation, Nitrification, Denitrification, Path of pollutants, Leaching, Nitrates, E. Coli, Chemical oxygen demand, Groundwater recharge, *Waste water treatment, *Arizona.
Identifiers: Tucson (Ariz).

Raw sewage was metered into a newly-constructed lagoon of the Pima County Department of Sanitation, Tucson, Arizona. Seepage losses were calculated from data on inflow, evaporation and change in storage. Water samples were obtained from shallow suction cups, a 40 ft. and a 60 ft. PVC well and a 100 ft. access tube, all located inside the lagoon. Samples from these wells, together with water samples from the lagoon, were examined for coliform organisms and various physical and chemical constituents. Of special concern were transformations in nitrogen. Estimated seepage rates in the lagoon during inundation ranged from 0.20 ft. per day to 0.10 ft. per day. Water level observations in wells reflected the percolation of effluent to the water table, 70 ft. below land surface. Initially, the nitrate ion levels in the suction cup samples were high, manifesting the leaching of indigenous soil nitrogen. With the onset of anaerobic conditions at the base of the lagoon, nitrification was inhibited at the soil surface and ammonia became the predominant form of nitrogen in the soil solution. Sorption of ammonium ion appeared to occur on clay particles in a soil zone of high cation exchange capacity. There were no undesirable microbial or chemical effects of recharge from lagoon seepage on native groundwater quality.
W74-01972

RECOVERY OF MERCURY IN SOLUTION,
Agricultural Research Service, Fort Collins, Colo. Plant Science Research Div.
G. W. Maag, and R. J. Hecker.
J Environ Qual. Vol 1, No 2, p 192. 1972.
Identifiers: Aluminum, *Mercury recovery, Pollutant, Sewage, *Separation techniques, *Ion exchange, *Waste water treatment, Waste disposal.

Hg in the metallic or ionic form is a poisonous pollutant when added to the sewage system. Analytical laboratories frequently use solutions which

contain Hg salts. Proper disposal of the waste solution is a problem. A recovery method is described in which Al releases its higher energy valence electrons to the Hg ions in solution, producing Al ions and metallic Hg. The metallic Hg is recovered; the waste solution containing the Al ions can be poured down the drain.--Copyright 1973, Biological Abstracts, Inc.
W74-01995

RADIOACTIVE WASTE MANAGEMENT, A BIBLIOGRAPHY OF PUBLICLY AVAILABLE LITERATURE PERTAINING TO THE USAEC'S SAVANNAH RIVER, S.C., PRODUCTION SITE.
Technical Information Center (AEC), Oak Ridge, Tenn.

Available from USAEC Tech. Inf. Center, P. O. Box 62, Oak Ridge, Tn. 37830; free. Report No. TID-3341, Aug. 1973. 39 p, 197 abstracts.

Descriptors: *Bibliographies, *Abstracts, Radioactivity, *Nuclear wastes, *Effluents, *Radioactive waste disposal, *South Carolina, Administrative agencies, Regulation, Air pollution, Water pollution, Soil contamination, Ecology, Food chains, Public health, Water pollution sources, Geology, Hydrology, Meteorology.
Identifiers: *Savannah River (S.C.), *Waste management.

This bibliography contains abstracts of 197 technical reports and journal articles which have appeared in Nuclear Science Abstracts from January 1951 through July 1973 pertaining to radioactive waste management at the Savannah River site. The abstracts are grouped into ten categories, they are arranged by NSA volume and abstract number. The ten categories are as follows: Environs Monitoring, Ecology, and Radiological Surveys; Savannah River Studies; Ground Disposal and Soil Studies; Geology, Hydrology, and Meteorology; Stack Disposal; Waste Storage Tanks and Corrosion Problems; Waste Fixation and Solidification; Waste Processing and Properties; Waste Management; and Miscellaneous. (Houser-ORNL)
W74-02008

RADIOACTIVE WASTE MANAGEMENT, A BIBLIOGRAPHY OF PUBLICLY AVAILABLE LITERATURE PERTAINING TO THE USAEC'S NATIONAL REACTOR TESTING STATION, IDAHO.
Technical Information Center (AEC), Oak Ridge, Tenn.

Available from USAEC Tech. Inf. Center, P. O. Box 62, Oak Ridge, Tenn. 37830, free. Report No. TID-3342, Aug. 1973. 59 p, 272 abstracts.

Descriptors: *Bibliographies, *Abstracts, Radioactivity, *Nuclear wastes, *Radioactive waste disposal, *Idaho, Regulation, Administrative agencies, Air pollution, Water pollution, Water pollution sources, Soil contamination, Food chains, Public health, Hydrology, Geology, Meteorology, Ecology, Environment.
Identifiers: *National Reactor Testing Station, *Waste management.

This bibliography contains abstracts of 272 technical reports and journal articles which have appeared in Nuclear Science Abstracts from January 1951 through July 1973 pertaining to radioactive waste management at the National Reactor Testing Station. The abstracts are grouped into nine categories. Within the categories, they are arranged by NSA volume and abstract number. The nine categories are as follows: Environs Monitoring, Ecology, and Radiological Surveys; Ground Disposal and Soil Studies; Geology, Hydrology, and Meteorology; Stack Disposal; Waste Storage Tanks and Corrison Problems; Waste Fixation and Solidification; Waste Processing and Properties; Waste Management; and Miscellaneous. (Houser-ORNL)
W74-02009

RADIOACTIVE WASTE MANAGEMENT, A BIBLIOGRAPHY OF PUBLICLY AVAILABLE LITERATURE PERTAINING TO THE USAEC'S OAK RIDGE, TENN. SITE.
Technical Information Center (AEC), Oak Ridge, Tenn.

Available from USAEC Tech. Inf. Center, P. O. Box 62, Oak Ridge, Tn. 37830; free. Report No. TID-3343, Sept. 1973. 85 p, 448 abstracts.

Descriptors: *Bibliographies, *Abstracts, Radioactivity, *Nuclear wastes, *Radioactive waste disposal, Tennessee, *Tennessee River, Air pollution, Water pollution, Water pollution sources, Soil contamination, Hydrology, Geology, Ecology, Meteorology, Food chains, Path of pollutants, Public health, Administrative agencies, Regulation.
Identifiers: *Clinch River (Tenn.), *Waste management.

This bibliography contains abstracts of 448 technical reports and journal articles which have appeared in Nuclear Science Abstracts from 1948 through July 1973 pertaining to radioactive waste management at the Oak Ridge site. The abstracts are grouped into ten categories. Within the categories, they are arranged by NSA volume and abstract number. The ten categories are as follows: Environs Monitoring, Ecology, and Radiological Surveys; White Oak Lake and Clinch River Studies; Ground Disposal and Soil Studies; Geology, Hydrology, and Meteorology; Stack Disposal; Waste Storage Tanks and Corrosion Problems; Waste Fixation and Solidification; Waste Processing and Properties; Waste Management; and Miscellaneous. (Houser-ORNL)
W74-02010

RADIOACTIVE WASTE MANAGEMENT IN ITALY,
Comitato Nazionale per L'Energia Nucleare, Rome (Italy).
G. Branca, F. Gera, M. Mirone, and F. Velona.
Available from Energia Nucleare, Vol. 19, No. 1, Jan. 1972. Energia Nucleare, Vol 19, No 1, p 17-25, January 1972. 4 tab, 6 ref.

Descriptors: *Nuclear powerplants, *Radioactivity, *Environment, *Radioactive waste disposal, Radioisotopes, Waste treatment, Water pollution, Oceans, Water pollution sources, Sea water, Gases, Liquid wastes, Solid wastes, Soil contamination.
Identifiers: *Italy, *Land burial.

Current practices of radioactive waste management in Italy are described. Amounts of waste produced by the nuclear power industry, nuclear research centers and radioisotope applications are estimated. The various methods of treatment for gaseous, liquid and solid waste are reviewed. The waste disposal practices in Italy include release of gaseous and liquid effluents to the environment and on-site burial or sea dumping of solid waste. Changes in waste treatment practices are likely to include solidification of high-level liquid waste and advanced decontamination techniques for gaseous and liquid effluents. In relation to solid waste disposal the evolution of present management schemes will probably include the development of centralized burial grounds. A discussion follows on the evolution of waste management criteria as a consequence of the extremely long confinement time that will be required in the future by the increasing amount of transuranics contained in the waste. (Houser-ORNL)
W74-02014

COMBINATION SEWAGE TREATMENT AND COOLING SYSTEM,
Cherne Industrial, Inc., Edina, Minn. (Assignee).
L. J. Boler.
U. S. Patent No. 3,760,946, 8 p, 7 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 914, No 4, p 1292, September 25, 1973.

Descriptors: *Patents, *Sewage treatment, *Liquid wastes, *Aeration, Bacteria, Condensation, Water quality control, *Waste water treatment, Water pollution control, Pollution abatement.
Identifiers: *Cooling system

Liquid sewage is conveyed along an extended continuous loop or recirculating path. Additional sewage can be introduced at least at one path along the conduit. A portion of the liquid is fed through cooling condensers of an operating plant and back into the sewage treatment conduit. The system includes propulsion and treating devices for maintaining at least a minimum rate of flow and for aerating the liquid. Liquid is removed from the sewage treatment conduit to settling tanks at a rate equal to the rate of incoming flow less evaporation and other losses. Sewage solids (with bacteria) in the settling tanks are returned to the treatment conduit near the entrance of the original raw sewage. The returned sewage seeds the raw sewage with colonies of active bacteria. (Sinha - OEIS)
W74-02028

WATER CONDITIONING SYSTEM,
Vulcan Labs., Inc., Pontiac, Mich. (assignee).
For primary bibliographic entry see Field 05F.
W74-02031

WAVE-POWERED AERATOR,
W. E. Palmer.
U. S. Patent No. 3,758,083, 3 p, 2 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 914, No 2, p 591, September 11, 1973.

Descriptors: *Patents, *Aerators, Oxygen, Nitrogen, *Waste water treatment, *Waves (Water), Lakes, Pollution abatement, Startification, Water quality control, Water pollution control.
Identifiers: *Wave energy.

An aerator comprises a long train or string of air chambers connected by means of check valves. The chambers alternate between rigid and flexible or compressible chambers. The chain extends downward beneath the surface of a body of water. Pressure differentials in the water caused by waves force the air into successively lower chambers until it reaches the bottom where it is released. The air released is formed in large bubbles, and these pass up through the entire depth to reach the surface, breaking up the stratification, while at the same time providing an extended period of time in which the compressed air is in contact with the bottom water. Not only does this invention add to the dissolved oxygen and nitrogen content to combat pollution, but it does so at the bottom where it is most needed. By using energy provided by waves only, power is saved. (Sinha - OEIS)
W74-02032

TWO-WAY FILTER,
A. S. Toth.
U. S. Patent No. 3,757,954, 3 p, 2 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 914, No 2, p 558, September 11, 1973.

Descriptors: *Patents, *Waste water treatment, *Filtration, *Filters, Water pollution control, Water quality control, Pollution abatement.

This apparatus makes possible selective filtration of different sizes of suspended solids by having the larger sizes conveyed gravitationally downward, and smaller sizes conveyed upward by the flow of water to the upper filter bed. There is provision for separate discharge and collection of

the two separate volumes of filtered fluid. Valves are adapted to close and open the influent member and the effluent conduits. A valved back-wash conduit is provided at the lower area of the vessel, together with an air-pressure inlet. (Sinha - OEIS)
W74-02033

WASTE WATER TREATMENT PACKAGE PLANT HAVING A MODULAR DITCH MEMBER,
D. D. Zebley.
U. S. Patent No. 3,757,950, 7 p, 8 fig, 8 ref; Official Gazette of the United States Patent Office, Vol 914, No 2, p 557, September 11, 1973.

Descriptors: *Patents, *Waste water treatment, *Aeration, *Chlorination, Pollution abatement, Water quality control, Water pollution control.

A package plant for waste water treatment is constructed in a modular fashion for installation inside or outside a building. It includes an elliptical ditch that receives waste water and has a controlled aerator. The ditch has a central supporting arrangement wherein a settler tank and a chlorination tank are mounted in separate, removable and side by side communicating fashion. The settler tank receives controlled over-flow from the ditch and acts mechanically to return sludge to the ditch. Clear water passes to the chlorination tank and is then aerated and recycled directly to the building for reuse. (Sinha - OEIS)
W74-02034

TREATMENT OF PULP MILL WASTES,
Betz Labs., Inc., Trevose, Pa. (assignee).
A. M. Stern, and L. L. Gasner.
U. S. Patent No. 3,737,374, 5 p, 1 tab, 5 ref; Official Gazette of the United States Patent Office, Vol 911, No 1, p 206, June 5, 1973.

Descriptors: *Patents, *Waste water treatment, *Pulp wastes, Lignins, Color, Biodegradation, *Microbial degradation, *Pseudomonas, Ozone, *Oxygenation, Fermentation, *Industrial wastes, Pollution abatement, Water quality control, Water pollution control.

A method for improving the color characteristics of pulp mill wastes and for utilizing the product to produce valuable materials or chemicals is provided. The first step is that of oxidatively treating the lignin so that it is depolymerized to produce nutrient carbon substrates containing low molecular weight structures. The nutrients are then treated with a microbial population to produce fermentation. The microbial population is selected from the group consisting of Pseudomonads, Aspergillus niger A.T.C.C. 16888; Aspergillus niger A.T.C.C. 9029; Penicillium chrysogenum A.T.C.C. 10002; and Acetobacter suboxydans A.T.C.C. 621. (Sinha - OEIS)
W74-02038

COLOR REMOVAL FROM KRAFT MILL AQUEOUS EFFLUENTS,
United States Plywood-Champion Papers, Inc., New York. (assignee).
H. A. Fremont.
U. S. Patent No 3,758,405, 4 p, 4 fig, 3 tab, 4 ref; Official Gazette of the United States Patent Office, Vol 914, No 2, p 665, September 11, 1973.

Descriptors: *Patents, *Pulp wastes, *Industrial wastes, Chemical reactions, *Color, Oxygen, *Waste water treatment, Pollution abatement, Water quality control, Water pollution control, Hydrogen ion concentration.

A continuous method of removing and disposing of organic color bodies found in liquid effluents from Kraft pulp manufacturing operations is presented. The first step is that of adjusting the pH from about neutrality to about 9. The effluent is then subjected to ultrafiltration to form an aqueous permeate and a retenate containing all of the color bodies. The retentate is heated in the presence of oxygen at a temperature and for time sufficient to oxidize the color bodies to colorless inorganic salts and inorganic gases. (Sinha - OEIS)
W74-02039

CONTINUOUS PROCESS FOR THE AIR OXIDATION OF SOUR WATER,
Texaco Inc., New York. (assignee).
D. E. McCoy, R. M. McEachern, and R. M. Dille.
U. S. Patent No 3,761,409, 3 p, 2 fig, 1 tab, 1 ref; Official Gazette of the Untied States Patent Office, Vol 914, No 4, p 1403, September 25, 1973.

Descriptors: *Patents, *Waste water treatment, *Oxidation, *Sulfates, *Sulfur compounds, Chemical reactions, Water quality control, Water pollution control, Pollution abatement.

This invention relates generally to air and water pollution abatement, and more particularly to a continuous, liquid phase, air oxidation process for converting sulfur compounds present in water to non-pollution, non-oxygen demanding sulfates. A continuous process is described for the liquid phase air oxidation of water containing sulfide anion and at least one other sulfur containing anion selected from the group consisting of thiosulfates, tetrathionates, polythionates, sulfites and polysulfides to convert said to sulfites. The steps are: adjusting the pH of the water to between about 6 to 13, heating the water to a temperature ranging from about 250 to 520 degrees F.; oxidizing the heated water under a pressure of around 75 to 800 p.s.i.g. at a liquid hourly space velocity of between 0.5 to 12.0 volumes of feed per reactor void volume with a noncatalytic, oxidizing medium containing from 0 to 500% excess oxygen basis stoichiometric conversion of sulfide to sulfates and recovering an effluent containing substantially no anion other than the sulfate. (Sinha - OEIS)
W74-02041

LIQUID AERATING ROTOR ASSEMBLY,
Cherne Industrial, Inc., Edina, Minn. (assignee).
L. J. Boler, N. S. Hanssen, B. J. Beaulieu, L. G. Cherne, and H. O. Halvorson.
U. S. Patent No 3,759,495, 8 p, 9 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 914, No 3, p 937, September 18, 1973.

Descriptors: *Patents, *Sewage treatment, *Aeration, *Rotors, *Waste water treatment, Equipment, Water pollution control, Water quality control, Pollution abatement.

This invention makes it possible to selectively control the particular portions of liquid in a sewage treatment conduit which are to be preferentially subjected to aeration. When a rotor is used which projects substantial quantities of liquid both downstream and upstream from the aeration rotor location, a deflecting surface prevents any substantial liquid portions projected in an upstream direction from re-entering the direct path of the liquid toward the rotor. Thus, the rotor can be positioned and operated so that it operates on that portion of the sewage liquid which has the greatest need of aeration, without consuming substantial power requirements in the immediate further aeration of liquid portions which have already reached a substantially higher level of oxygen content. Selective positioning of a deflector upstream or downstream from the rotor helps control the rate of liquid flow. (Sinha - OEIS)
W74-02042

WASTEWATER TREATMENT AND REUSE BY LAND APPLICATION - VOLUME I - SUMMARY,
Metcalf and Eddy, Inc., Palo Alto, Calif.
C. E. Pound, and R. W. Crites.
Copy available from GPO Sup Doc as EP1.23: 660-73-006a, $1.00; microfiche from NTIS as PB-225 940, $1.45. Environmental Protection Agency, Technology Series Report EPA-660/2-73-006a, August 1973. 80 p, 3 fig, 15 tab, 64 ref.

Descriptors: *Irrigation systems, *Land management, *Water reuse, Design criteria, *Waste water treatment, Costs, *Groundwater recharge, *Public health, Environmental effects, *Sewage treatment, Industrial wastes, Climatic zones, Reclaimed water, Waste water disposal, Soil treatment, History, Crops, Percolation, Recycling.

A nationwide study was conducted of the current knowledge and techniques of land application of municipal treatment plant effluents and industrial wastewaters. Selected sites were visited and extensive literature reviews were made (annotated bibliography will be published separately). Information and data were gathered on the many factors involved in system design and operation for the three major land application approaches: irrigation, overland flow, and infiltration-percolation. In addition, evaluations were made of environmental effects, public health considerations, and costs--areas in which limited data are available. Irrigation is the most reliable land application technique with respect to long term use and removal of pollutants from the wastewater. It is sufficiently developed so that general design and operational guidelines can be prepared from current technology. Overland flow was found to be an effective technique for industrial wastewater treatment. Further development is required to utilize its considerable potential for municipal wastewater treatment. Infiltration-percolation is also a feasible method of land application. Criteria for site selection, groundwater control, and management techniques for high rate systems need further development. (See also W74-02044) (EPA)
W74-02043

WASTEWATER TREATMENT AND REUSE BY LAND APPLICATION - VOLUME II,
Metcalf and Eddy, Inc., Palo Alto, Calif.
C. E. Pound, and R. W. Crites.
Copy available from GPO Sup Doc as EP1.23: 660-73-0066, $2.40; microfiche from NTIS as PB-225 941, $1.45. Environmental Protection Agency, Technology Series Report EPA-660/2-73-006b, August 1973. 249 p, 14 fig, 34 tab, 142 ref. EPA Program Element 1B2045, Contract 68-01-0741.

Descriptors: *Land management, *Water reuse, *Bibliographies, Irrigation systems, Design criteria, *Waste water treatment, Costs, *Groundwater recharge, *Public health, Environmental effects, *Sewage treatment, Industrial wastes, Climatic zones, Reclaimed water, Waste water disposal, Soil treatment, History, Crops, Percolation, Recycling.

Recommendations include: (1) When evaluating land application approaches for treatment as compared to conventional or advanced waste treatment processes, factors such as economics, simplicity of operation, and degree of renovation should be considered as well as the potential water reuse and the best use to be made of the land. (2) To gain public acceptance and support for land application projects, realistic implementation programs, including public relations, should be developed to accompany any planning activities for wastewater management. (3) The operation of many existing systems can be enhanced through analysis of successful practices at other locations, evaluation of the key factors important to management, and initiation of monitoring of water quality changes throughout the system. (4) Design and operation practices in land application are so dependent on local conditions that a detailed design or operations manual would likely stifle, rather than advance, the state-of-the-art. (See also W74-02043) (EPA)
W74-02044

SLIDE GLASS METHOD FOR TESTING SLIME IN INDUSTRIAL WATER AND WASTE (IN JAPANESE),
Tokyo Univ. (Japan). Faculty of Pharmaceutical Sciences.
For primary bibliographic entry see Field 05A.
W74-02073

ECONOMIC GUIDELINES FOR PUBLIC UTILITIES PLANNING,
Duke Univ., Durham, N.C. Dept. of Civil Engineering.
J. S. Dajani, and R. S. Gemmell.
Journal of the Urban Planning and Development Division, American Society of Civil Engineers, Vol 99, No UP2, Proceedings paper No. 9977, p 171-182, September 1973. 3 fig, 3 tab, 13 ref. OWRR A-042-ILL (2).

Descriptors: *Sewers, *Design, Networks, Waste water (Pollution), *Treatment facilities, Size, Treatment, *Costs, Diseconomies of scale, Algorithms, *Utilities, Population, Density, Installation costs, Mathematical models, Systems analysis, Optimization.
Identifiers: *Economic analysis, Urban development, Nonlinear programming.

The wastewater collection utility is used to demonstrate the need and possibility of developing a normative mathematical relationship between the cost of installing such a utility on the one hand and the area being served and population density on the other. On the basis of an analysis of optimal network designs which were obtained by a nonlinear programming algorithm, diseconomies of scale exist with increasing network size. This implies that a number of smaller and simpler networks may be constructed at a greater economy than a large enveloping system and treatment plant size. The combination of these factors--the network costs and the treatment costs--indicates that a minimum per capita cost solution exists. The size of the system at which a minimum cost is obtained is highly sensitive to the density of the population in the area being served but is relatively insensitive to the size of the service area. (See also W71-11861) (Bell-Cornell)
W74-02114

COMPREHENSIVE SEWERAGE PLAN FOR GRAND ISLAND, NEBRASKA.
Black and Veatch, Kansas City, Mo.

City of Grand Island, Nebraska, June 25, 1968. 45 p, 1 fig, 5 tab.

Descriptors: *Comprehensive planning, *Sewerage, *Forecasting, *Future planning (Projected), Sewage treatment, Sewage disposal, Hydraulic structures, Urbanization, Sewers, Construction costs, Financing, *Nebraska, *Waste water treatment.
Identifiers: *Grand Island (Neb).

Anticipated future growth of the area surrounding the city of Grand Island, Nebraska requires planning for the provision of sewerage. An area of 22,000 acres which presently is not served by sewers was studied along with an area of 7,500 acres that is served by sewers. Population estimates indicate that a potential of 90,000 people will reside within the unserved area, and 32,000 people within the serviced area, by year 2050. The report includes analyses of these population projections to determine patterns of growth. Land use patterns were similarly studied, and both short-term (10 years and less) and long-term (over 10 years) plans of action were developed. Cost estimates and methods of financing were discussed, as were methods of keeping the plan up dated. For all foreseeable construction, the estimated cost is set at $19,577,000, of which $2,431,000 is described as immediate construction. Primarily, the improvements required consist of the construction of additional sewers. Some expansion of the treatment facilities will also be needed. Financing methods considered include: (1) federal grants, (2) state aid, (3) general city tax funds, (4) sewer user fees, and (5) municipal bonds. (Poertner)
W74-02123

TECHNICAL AND ECONOMIC EVALUATION OF EXISTING WASTEWATER TREATMENT FACILITIES AND ALTERNATIVE METHODS OF DISPOSAL OF TREATED EFFLUENT, HOUSTON, MISSOURI.
Bartholomew (Harland) and Associates, St. Louis, Mo.

Prepared for City of Houston, Missouri, July 1972. 111 p, 13 fig, 22 tab, 16 ref, 3 append.

Descriptors: *Return flow, *Water pollution control, *Sewage disposal, *Sewage treatment, *Missouri, Sewage effluents, Water pollution sources, Municipal wastes, Waste water disposal, Soil disposal fields, Sewage lagoons, *Treatment facilities.
Identifiers: *Houston (Missouri).

The City of Houston, Missouri was put under orders by the State to develop a system to prevent any discharge of sewage effluent to the Big Piney River. The State had suggested evaporation or irrigation of the effluents. Evaporation was quickly eliminated as a feasible solution since precipitation exceeds evaporation in this geographical area. Irrigation of sewage effluent was studied in greater detail. But, although this method has been found to be feasible elsewhere, it is not recommended for the City of Houston. The most strenuous objection to this method involves the possibility of ground water pollution. Ground water pollution problems in the area are accented by both high ground water levels and low infiltration rates. Although it would be technologically feasible to use a very large acreage, with corresponding low infiltration rates, such a solution is not economically feasible. The study recommends that the State be petitioned to modify the orders from 'zero discharge' to a discharge compatible with water uses. (Poertner)
W74-02125

ENGINEERING DESIGN REPORT FOR SPRAY IRRIGATING WASTEWATER FROM THE SANITARY DISTRICT OF BEARDSTOWN AND THE OSCAR MAYER AND CO. MEAT PROCESSING PLANT.
Horner and Shifrin, Inc., St. Louis, Mo.

Prepared for City of Beardstown, Illinois, December 1972. 41 p, 4 fig, 2 tab, 6 append.

Descriptors: *Waste water treatment, *Waste water disposal, *Soil disposal fields, *Illinois, Soil treatment, Irrigation, Municipal wastes, Industrial wastes, Water pollution control, Sprinkler irrigation, *Water reuse.
Identifiers: *Beardstown (Illinois).

The Beardstown, Illinois Sanitary District, along with Oscar Mayer and Co., studied spray irrigation for final treatment and disposal of sewage. A preliminary study showed that the method was feasible. More precise engineering details were developed in this report. A 1985 estimated design flow of 13,500,000 gallons was used, although flow rates from 9,000,000 gallons per week to 17,000,000 gallons per week are expected. Preliminary treatment will include ammonia stripping by lime treatment, chlorinations, and anaerobic lagoon treatment as well as aeration of the waste in intermediate ponds. Contamination of groundwater is not thought to be a significant problem, but constant monitoring of the groundwater is recommended. High ground water levels are present and existing ditches will be used to keep ground water levels at least 5 feet below the surface. The land is planned for agricultural use, and revenue as high as $20,000 a year is anticipated to help offset operating costs which are expected to be $59,000 annually. Total capital costs are estimated at $1.18 million plus $152,000 for additional anaerobic lagoons and aerated ponds for Oscar Mayer and Co. wastes. The total area involved will be 740 acres, of which 580 will be irrigated, and the remainder used for a buffer zone and treatment facilities. (Poertner)
W74-02126

WATER AND THE LAND: OPPORTUNITIES AND PROBLEMS IN FORSYTH, NORTH CAROLINA.
City-County Planning Board, Winston-Salem, N.C.
For primary bibliographic entry see Field 04A.
W74-02129

WATER SUPPLY AND SEWERAGE SERVICES: TOOLS FOR AFFECTING THE QUALITY OF LIFE IN FORSYTH COUNTY, N.C., VOLUME D IN THE LAND POTENTIALS SERIES.
City-County Planning Board, Winston-Salem, N.C.

1971. 60 p, 9 fig, 10 tab.

Descriptors: *Water supply, *Sewerage, *Regional development, *Land use, Regional analysis, Urbanization, *North Carolina, Environmental control, Environmental sanitation, Non-structural alternatives.
Identifiers: *Forsyth County (NC), *Winston-Salem (NC).

The future growth of Forsyth County, North Carolina and the influence of water supply and sewerage services were investigated. Instead of merely supplying water and sewerage to developing areas, it was found that development can be controlled by supplying these services on a selective basis. This can lead to better service at a lower cost, and a more efficient service, than if water and sewerage are provided for uncontrolled growth. This concept can also be beneficial in protecting the quality of life. It is an efficient means of zoning, and can be used to protect the quality of the soil, air and water. Planning for growth by selective installation of water and sewerage facilities can identify areas that should be left in their undeveloped states, as well as protecting water quality by providing adequate sewage treatment. However, there are serious problems to be overcome, including intergovernmental cooperation and accurate forecasts of future growth. Based on 1950-1960 growth projections, the population in the year 2,000 was estimated at 420,000. (Poertner)
W74-02130

UNITARY WATER SUPPLY AND SEWERAGE SERVICES.
City-County Planning Board, Winston-Salem, N.C.

June 1973. 31 p, 2 fig, 9 tab, 24 ref, 3 appendices.

Descriptors: *Water supply, *Sewerage, *Planning, Water resources development, Regional development, Administration, *North Carolina, Management.
Identifiers: *Forsyth County (N.C.).

Methods for providing public sewerage in Forsyth County, North Carolina, were studied. It was concluded that a unitary community system for collection, treatment, and disposal would be more efficient than independent systems on both short-term and long-term bases. Such a system would also have important side benefits. A unitary system can be used to regulate growth or channel growth by selective provision of service. A quasi-autonomous authority could be used to run the system, and be held responsible to local govern-

ments through budget review and other measures. Such a system would provide for unified service across a regional area and would require the cooperation of local governmental units. The statutory authority for establishing a consolidated management system presently exists. It is concluded that a consolidated system is inevitable. The major problem concerns when the consolidation will occur and how it will be brought about. (Poertner)
W74-02131

MUNCIE SANITARY DISTRICT, 1972, 8TH ANNUAL REPORT.
Muncie Sanitary District, Ind.

1972. 60 P, 5 FIG, 40 TAB.

Descriptors: Documentation, *Data collections, *Municipal wastes, *Sewage treatments, Environmental sanitation, Water pollution control, Waste water treatment, Publications, *Indiana.
Identifiers: *Muncie (Indiana).

The Muncie (Indiana) Sanitary District recently organized a Water Quality Section to deal with water pollution problems. The 1972 annual report of the District contains the first annual report of the Water Quality Section along with the annual report of the entire district. The general report includes sections on: (1) personnel, (2) precipitation, (3) sewage characteristics, (4) level of treatment, (5) sewer maintenance, and (6) a financial statement. The Water Quality Section was established to prevent and control water pollution in local waters. Efforts to clean local waters began in the 1940's when the first stream law was passed. In June 1970, the District hired a natural resource consultant to deal with area pollution. The staff was subsequently enlarged and increased to 8 people in March 1972. Five automatic samplers have been permanently installed in the field to continuously monitor industrial wastes which constitute 20 percent of Muncie's water pollution problems. The remaining 80 percent is attributed to raw sewage discharges from residential areas, storm overflows, and non-functioning septic tanks. The cooperation and participation of the populace is solicited and recommendations are made to keep informed, to become involved in local conservation organizations and to report violations of water pollution. (Poertner)
W74-02133

COMPARISON OF SEWER DISCHARGE HYDROGRAPHS COMPUTED FROM IN-SEWER MEASUREMENTS AND FROM SYNTHESIZED HYDROGRAPH PROCEDURES, CITY OF ST. PAUL, MINNESOTA.
Horner and Shifrin, Inc., St. Louis, Mo.

Prepared for City of St. Paul Department of Public Works, Minnesota, March 16, 1971. 32 p, 11 fig.

Descriptors: *Sewers, *Runoff forecasting, Hydrology, *Hydrographs, *Synthesis, *Hydrograph analysis, Runoff, Drainage, Urban drainage, Hydrologic systems, Hydrologic data, *Minnesota, Theoretical analysis, Measurement, Assay.
Identifiers: *St. Paul (Minn).

A study was made to compare measured sewer hydrographs with computed hydrographs for sewers in St. Paul, Minnesota. This comparison was performed to determine the validity of using synthesized hydrograph procedures in designing sewer overflow control facilities. Eleven rainfall events were analyzed by both methods. Data from the sewers were analyzed, and in some cases modified, by the St. Anthony Falls Hydraulic Laboratory of the University of Minnesota. Generally, the modification resulted in closer agreement in mass discharges when comparing the developed hydrograph with the computed mass discharge. A synthesized hydrograph was then prepared and plotted for each of the eleven rainfall events. Comparison of mass discharge volume resulted in agreement within 8 percent for 6 of the storms and within 16 percent in 3 of the storms. Using transparent overlays, it was found that the configuration of the synthesized hydrograph is generally the same as the measured hydrograph. In the cases that the configurations are not similar, possible explanations for the dissimilarity are suggested. It was concluded that the use of synthesized hydrographs is an acceptable method. (Poertner)
W74-02135

STUDY OF SEWER SEPARATION: PHASE I, CITY OF ST. PAUL, MINNESOTA.
Horner and Shifrin, Inc., St. Louis, Mo.

City of St. Paul, Department of Public Works, Minnesota, September 1968. 45 p, 19 fig, 1 tab, 3 appendices.

Descriptors: *Sewers, *Sewerage, *Water pollution sources, *Water pollution control, Interceptor sewers, Separated sewers, Outfall sewers, Combined sewers, Urban drainage, Drainage systems, *Minnesota, Mississippi River, Water pollution.
Identifiers: *St. Paul (Minn).

The overflow from combined sewers of the City of St. Paul, Minnesota was causing pollution in the Mississippi River. Six alternatives were studied to allievate this pollution. The Minnesota Pollution Control Agency set criteria that practically requires the solution to the problem to the equivalent of separation of the combined sewer system. The six alternatives studied are: (1) complete separation, (2) partial separation, (3) an increase in interceptor sewer and treatment plant capacity, (4) storage of combined flows, (5) disinfection of combined flows, and (6) regulation of the combined sewer system. Regulation of the sewer system was being undertaken by the Minneapolis-St. Paul Sanitary District at the time of this study. A preliminary plan was suggested by this study, consisting of a composite of some of the features of the alternatives. In some areas, separation of sewers is recommended, with the exception of roof drain water still flowing to the sanitary sewers. In other areas, chlorinated interceptor sewers are recommended for combined overflows. In about 40 percent of the city, storm sewers would carry runoff directly to the Mississippi River. A second phase of this study will more closely examine this plan and study possible modifications. (Poertner)
W74-02136

5E. Ultimate Disposal of Wastes

SURVEY OF INDUSTRIAL WASTE INJECTION WELLS, VOLUME III,
Missouri Univ., Rolla. Dept. of Geological Engineering.
D. L. Warner.
Available from NTIS, Springfield, Va. 22151 AD-756 643 Price $9.00 printed copy; $1.45 microfiche . Final Technical Report, June 1972. 684 p. GS 14-08-0001-12280 ARPA Order No 1684.

Descriptors: *Water pollution control, *Industrial wastes, *Injection wells, *Waste disposal, Reviews, United States, Sites, Drilling, Geology, Hysrogeology, *Well data, Waste treatment, Well regulations, Economics, *Surveys, Data collections.
Identifiers: *Waste injection wells survey.

This survey of industrial waste injection wells in the United States furnishes the following information (when available) for each well: (1) operating company and general well location; (2) well location (legal description); (3) history, system planning, construction and operation; (4) geology and geohydrology; (5) well design and construction; (6) description of surface equipment; (7) cores, samples, and logs; (8) waste characteristics; (9) preinjection waste treatment; (10) well operation and operating history; (11) regulatory; (12) economics; and (13) sources of information and published references. (See also W73-12051 and W73-12576) (Woodward-USGS)
W74-01714

RADIOACTIVE WASTE MANAGEMENT, A BIBLIOGRAPHY OF PUBLICLY AVAILABLE LITERATURE PERTAINING TO THE USAEC'S SAVANNAH RIVER, S.C., PRODUCTION SITE.
Technical Information Center (AEC), Oak Ridge, Tenn.
For primary bibliographic entry see Field 05D.
W74-02008

RADIOACTIVE WASTE MANAGEMENT, A BIBLIOGRAPHY OF PUBLICLY AVAILABLE LITERATURE PERTAINING TO THE USAEC'S NATIONAL REACTOR TESTING STATION, IDAHO.
Technical Information Center (AEC), Oak Ridge, Tenn.
For primary bibliographic entry see Field 05D.
W74-02009

RADIOACTIVE WASTE MANAGEMENT, A BIBLIOGRAPHY OF PUBLICLY AVAILABLE LITERATURE PERTAINING TO THE USAEC'S OAK RIDGE, TENN. SITE.
Technical Information Center (AEC), Oak Ridge, Tenn.
For primary bibliographic entry see Field 05D.
W74-02010

GROUND DISPOSAL OF REACTOR COOLANT EFFLUENT,
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 05B.
W74-02013

DISPOSAL OF WASTE HEAT,
Department of the Interior, Washington, D.C. (Assignee).
For primary bibliographic entry see Field 05B.
W74-02029

FLOATABLE-SUBMERSIBLE VESSEL CONTAINER,
Nuclear Waste Systems Co., Campbell, Calif. (assignee).
For primary bibliographic entry see Field 05B.
W74-02040

THE STATUS OF THE RADIOACTIVE WASTE DISPOSAL PROBLEM,
For primary bibliographic entry see Field 05B.
W74-02054

TECHNICAL AND ECONOMIC EVALUATION OF EXISTING WASTEWATER TREATMENT FACILITIES AND ALTERNATIVE METHODS OF DISPOSAL OF TREATED EFFLUENT, HOUSTON, MISSOURI.
Bartholomew (Harland) and Associates, St. Louis, Mo.
For primary bibliographic entry see Field 05D.
W74-02125

5F. Water Treatment and Quality Alteration

WATER QUALITY AND HUMAN HEALTH,
Ministry of Health, New Delhi (India).
T. Viraraghavan.
Journal of the American Water Works Association, Vol 65, No 10, p 647-650, October 1973. 3 photos, 33 ref.

Descriptors: *Water quality, *Public health, Diseases, *Potable water, *Water pollution, Viruses, Coliforms, Pathogenic bacteria, Nematodes, Water supply, Water treatment.
Identifiers: Cholera, Poliomyelitis, Hepatitis, Raw water.

In the U.S. between 1946-1960, over 26,000 cases of water-related illnesses were reported. Use of untreated groundwater was a disproportionate cuase of illness. Viruses in municipal water supplies are said to have caused a 1955-56 cholera epidemic of 28,745 cases in New Delhi and a 1944-45 epidemic in Pennsylvania. There is a suggestion that viruses may be slipping through present water treatment methods, in some cases because raw water concentrations of viruses are too high. The use of coliform counts as surrogate measures for virus presence is discussed, with the conclusion that the practice is satisfactory. Chances of nematodes ingesting pathogens and being carried through the water system in a day are extremely small. The needs for surveillance of relationships between soft drinking water and heart disease, long-term mercury concentrations and health, and nitrates and disease are pointed out. Probably most of the new contaminants reaching public eater supplies are organic compounds which come from insecticides, fertilizers, detergents, auto fuels, lubricants, paints, and other industrial products. Of the $144 million spent for water research in 1968, only $2 million was spent for health-related research; more research on the effects of exotic contaminants is needed. (Stein-North Carolina)
W74-01865

ORGANISMS IN PUBLIC WATER MAINS AND THEIR SIGNIFICANCE FOR DRINKING WATER AS FOOD, (IN GERMAN),
Wasserwirtschaftsdirektion Mittlere Elbe-Sude-Elde, Magdeburg (East Germany).
H. Klapper, and W. Schuster.
Angew Parasitol. Vol 13, No 2, p 83-90. 1972. Illus. (English summary).
Identifiers: Animals, *Bacteria, Eradication, Human, Organisms, *Potable water, *Taste, Water mains.

The infestation of public eater mains with living organisms is widespread. The consumers are nauseated by visible contamination with living animals which are also hygienically dangerous. After the organisms die, the bacterial count is increased, and the drinking water has a bad taste. Eradication is necessary. Methods for killing the organisms without interrupting the water supply are shown.--Copyright 1973, Biological Abstracts, Inc.
W74-01898

WATER RESOURCES OF THE RUSTON AREA, LOUISIANA,
Geological Survey, Baton Rouge, La.
For primary bibliographic entry see Field 04B.
W74-01921

APPARATUS PARTICULARLY USEFUL FOR CHLORINATING A RESERVOIR,
J. M. Morrison.
U. S. Patent No. 3,760,947, 6 p, 16 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 914, No 4, p 1292, September 25, 1973.

Descriptors: *Patents, *Reservoirs, *Pollution abatement, *Chlorination, Swimming pools, *Water treatment, Water quality control, Water pollution control, Environmental sanitation.

A long thin flexible teflon tube extends in a drain line of a reservoir from the point where the line opens into the bottom of the reservoir to a point outside the reservoir. Outside the reservoir the tube is removably connected to a chlorine gas bottle. At the point where the tube is connected to the bottle a fixed metering port is provided. There is also provided a protector tube surrounding the thin tube from the drain line to the chlorine bottle, and a gas diffuser is connected to the end of the thin tube where it opens into the reservoir. A method of installing the apparatus is described wherein one end of the thin tube is placed into the drain line at the bottom of the reservoir, and then, by drawing water from the reservoir through the drain line, the tube is drawn through the drain line to a point outside the reservoir, and then the tube is passed through a hole in the side of the line at a point outside the reservoir. The tube is then connected to a chlorine gas bottle. (Sinha-OEIS)
W74-02027

WATER CONDITIONING SYSTEM,
Vulcan Labs., Inc., Pontiac, Mich. (assignee).
F. J. Drayton, Jr.
U. S. Patent No. 3,759,387, 5 p, 2 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 914, No 3, p 909, September 18, 1973.

Descriptors: *Patents, *Recirculated water, Reclaimed water, *Water reuse, Additives, *Water treatment.
Identifiers: Water conditioning.

A control system is described for regulating the introduction of various additives into a recirculating water system including a main control cabinet carrying a flow counter for makeup water and timers for controlling additive pumps to add corrosion inhibitor, alkalinity control agents, or other additives after a predetermined quantity of makeup water has been added to the system. The main control unit further includes a clock and a bistable control device for alternately introducing distinct biocides from first and second supplies to the recirculating water. Level detectors and alarm devices are provided for the additive supply containers. The control system further provides a timer for controlling the operation of a bleed-off solenoid valve to control the dissolved solids level in the recirculating water system. (Sinha - OEIS)
W74-02031

SERUM ELECTROLYTES AND SKELETAL MINERALIZATION IN HARD- AND SOFT--WATER AREAS,
For primary bibliographic entry see Field 05C.
W74-02053

INDEX OF DRINKING WATER POLLUTION: TOTAL COLIFORM MPN TESTS: CONFIRMED TEST VERSUS COMPLETED TEST,
British Columbia Provincial Lab., Vancouver.
For primary bibliographic entry see Field 05A.
W74-02087

5G. Water Quality Control

SURVEY OF INDUSTRIAL WASTE INJECTION WELLS, VOLUME III,
Missouri Univ., Rolla. Dept. of Geological Engineering.
For primary bibliographic entry see Field 05E.
W74-01714

EVALUATIONS OF ABATE FOR MOSQUITO CONTROL IN POLLUTED WATER,
J. L. McDonald.
Mosq News, Vol 32, No 4, p 627-631, 1972, Illus.
Identifiers: *Abate, Armigeres-subalbatus, Culex-fatigans, *Mosquito control, Polluted waters, Septic, Tanks, Water pollution control.

Three physical forms of Abate (Kobrite and perlite granules and Tossits) were evaluated with respect to their control of Culex fatigans and Armigeres subalbatus mosquitoes in polluted waters. Three ditches and 5 septic tanks with polluted waters (mosquito breeding sites) were used for this evaluation. Water flow rates dramatically influenced the length of the active period of Abata. Where water stands, Abate works best.--Copyright 1973, Biological Abstracts, Inc.
W74-01741

NITRATE IN UNSATURATED ZONE OF AN ALLUVIAL SOIL IN RELATION TO FERTILIZER NITROGEN RATE AND IRRIGATION LEVEL,
Michigan State Univ., East Lansing. Dept. of Crop and Soil Sciences.
For primary bibliographic entry see Field 02G.
W74-01774

NOTE ON BIOASSAY TRIALS ON THE EFFECT OF RAINFALL ON ACARICIDE RESIDUES,
Central Plant Protection Training Inst., Hyderabad (India).
For primary bibliographic entry see Field 05B.
W74-01777

ROLE OF THE FEDERAL GOVERNMENT IN CONTROLLING NUTRIENTS IN NATURAL WATERS,
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
For primary bibliographic entry see Field 05C.
W74-01808

DEVELOPMENT OF NUTRIENT CONTROL POLICIES IN CANADA,
Department of Energy, Mines and Resources, Ottawa (Ontario). Inland Waters Branch.
For primary bibliographic entry see Field 05C.
W74-01809

EVALUATING WATER BASED RECREATION FACILITIES AND AREAS,
North Carolina State Univ., Raleigh. Dept. of Recreation and Park Administration.
For primary bibliographic entry see Field 06B.
W74-01831

POLLUTION ABATEMENT AND UNEMPLOYMENT. A METHODOLOGICAL STUDY,
Institute of Public Administration, Washington, D.C.
J. Hoicka, T. Trumbull, and H. Scott.
Available from NTIS as PB-207 109 $3.00 in paper copy, $1.45 in microfiche. Environmental Protection Agency, Rockville, Maryland, Office of Air and Water Programs, APTD-0921, January 1972. 146 p, 8 tab, 42 ref, 2 append. EPA-EHS 70-126.

Descriptors: *Pollution abatement, *Unemployment, *Air pollution, Methodology, Industries, Costs, Federal government, Estimating, Prices, Foreign trade, Financing, Model studies, Legal aspects.
Identifiers: Labor intensive industry, Capital intensive industry, Resource intensive industry.

A methodology is developed to estimate the magnitude of unemployment that may occur as a result of plant closures caused by pollution abatement requirements. It specifies types of financial assistance required to avoid closure, and describes the type of plants which are expected to be affected. Two types of plants were identified by the

methodology as being subject to closure in order to avoid the expense of pollution abatement. Non-viable plants, the smallest and most absolescent in each industry, are those which could not afford to pay for pollution abatement costs without subsidy and are thus expected to close causing unemployment. Although many of these plants would close within a few years regardless of pollution controls, a substantial number are found in areas of chronically high unemployment and if these industries are in some sense considered critical, further study is recommended. Potentially viable plants, those requiring only a loan for initial outlay for abatement equipment, are expected to be smaller in number and for the most part qualified for Small Business Administration loans. Limited availability of data resulted in a crude methodology, but three case studies apply it to labor, capital, and resource intensive industries. (Weaver-Wisconsin)
W74-01835

OPTIMAL CAPITAL ACCUMULATION IN A POLLUTED ENVIRONMENT,
Australian National Univ., Canberra.
B. A. Forster.
Southern Economic Journal, Vol 39, No 4, p 544-547, 1973. 10 ref.

Descriptors: *Gross national product, *Environmental effects, *Costs, *Capital, Pollution abatement, Model studies, Welfare (Economics).
Identifiers: *Environmental pollution, *Economic growth.

Usual emphasis upon the importance of economic growth overlooks the increasing production of waste associated with the growth. Thus, the effects of explicitly introducing pollution into the neoclassical growth model are investigated. Pollution present at any particular time is considered a function of the capital stock and level of pollution control expenditure at that time. The efficiency of pollution control is assumed to be decreasing with the increase of the level of expenditure involved. An objective of maximizing the discounted flow of utility over an infinite time horizon is assumed by the planning authority. This objective is subject to a set of conditions both constraining the level of pollution control and the time rate of change of the shadow price of capital, and requiring complete utilization of output, non-satiable utility for consumption, and maintenance of the stock of capital sufficient to compensate its depreciation. Analysis indicates that consideration of pollution results in a lower capital stock and a lower level of consumption than when pollution is ignored as in the neoclassical analysis. (Weaver-Wisconsin)
W74-01840

THE STEEL INDUSTRY AND ENVIRONMENTAL QUALITY.
National Industrial Pollution Control Council, Washington, D.C. Steel Sub-Council.

Report, August 1972. 22 p, 2 fig.

Descriptors: *Pollution abatement, *Industries, *Costs, Water pollution control, Air pollution, Waste disposal, Federal government, Standards, Regulation, Financing, Tax rates.
Identifiers: *Steel industry.

Typical accomplishments of the United States steel industry in their implementation of environmental control programs are summarized. A variety of major environmental pollutants arise from the steel fabricating process which are compounded by its massive scale thus contributing to the immensity of pollution control and abatement problems. Data indicate that the industry has budgeted a larger percentage of its capital expenditures for environmental improvement than any other industry. Case histories review recent actions and projects taken by specific firms. With regard to resource supplies, new techniques in recycling will ensure that scrap will continue to provide over 50% of the raw materials needed for new steel. Despite this progress, the expenditures required to meet future environmental improvement schedules would be a staggering burden for the industry given its current economic status. It is recommended that (1) pollutant removal standards be carefully determined through cost-benefit and efficiency analysis, (2) low interest federal loans be made available, (3) the feasibility of combined municipal-industrial treatment plants be investigated, (4) expenditures for non-productive pollution control facilities be deductible from Federal income tax, and (5) uncertainty be eliminated from standards so that facilities designed for pollution control do no become obsolete with changing regulations. (Weaver-Wisconsin)
W74-01841

A STUDY OF THE ECONOMIC IMPACT ON THE STEEL INDUSTRY OF THE COSTS OF MEETING FEDERAL AIR AND WATER POLLUTION ABATEMENT REQUIREMENTS. PART III.
Booz-Allen Public Administration Services, Inc., Washington, D.C.

Available from NTIS as PB-211 919 $5.45 in paper copy, $1.45 in microfiche. Council on Environmental Quality, Washington, D.C. July 1972. 125 p, 2 fig, 26 ref.

Descriptors: *Pollution abatement, *Economic impact, *Costs, Air pollution, Regulation, Industries, Industrial production, Regional economics, Unemployment.
Identifiers: *Steel industry.

Based on sustained economic growth of at least 4% per year for the period 1972-1976, steel consumption is predicted to be in the 120-130 million ton range by 1976. Potential net steel shipments, capacity limitations aside, are predicted to be between 106-113 million tons per year by 1976 given estimated domestic consumption and import penetration. Estimated current sustainable steel shipment capacity based on partial and incomplete information is between 98 and 105 million tons per year. To meet the potential shipments estimated for 1976 total domestic steel capacity may require expansion by as much as 16 million tons. Required capital expenditures to modernize and maintain existing plant and equipment during the period 1972-1976 are estimated to total $6.85 billion (1971 dollars). Expenditures needed to increase capacity may be as much as $6.53 billion for the same period. Based on pollution control cost estimates supplied by the Council for Environmental Quality and predicted accelerated capital expenditures to replace equipment which can not economically be cleaned up, steel price increases of approximately 4.3% per year will be required if industry growth is to be maintained although this estimate is subject to many uncertainties. (See also W73-10312 and W73-12707) (Weaver-Wisconsin)
W74-01844

NATURAL CONCERN: AN ECOLOGICAL ANALYSIS OF BIBB COUNTY.
Macon-Bibb County Planning and Zoning Commission, Macon, Ga.
For primary bibliographic entry see Field 06G.
W74-01848

OPEN SPACE: PRELIMINARY PLAN.
Los Angeles Dept. of City Planning, Calif.
For primary bibliographic entry see Field 06G.
W74-01849

WATER MANAGEMENT.
Orange-Seminole-Osceola Planning Commission, Orlando, Fla.
For primary bibliographic entry see Field 06F.
W74-01850

WATER POLLUTION, ENVIRONMENTAL ENHANCEMENT STUDY, (4).
Lehigh-Northampton Counties Joint Planning Commission, Lehigh Valley, Pa.

Part 4 of Environmental Enhancement Study, September, 1972. 193 p, 3 fig, 6 maps, 10 tab, 4 append. Supported in part by HUD 701 funds.

Descriptors: *Planning, *Water quality control, Water pollution, *Water pollution sources, Water pollution effects, *Legislation, *Pennsylvania, Water law, Regulation, Watersheds, Delaware River Basin Commission, Drainage, *Water quality standards.
Identifiers: *Citizen participation, Lehigh County (Penn), Northampton County (Penn).

The occurrence of water on the earth and the processes by which it reaches inland areas are discussed. The drainage network for Lehigh and Northampton Counties in Pennsylvania are identified as a hierarchical system consisting of the Delaware River, the Lehigh and Schuylkill Rivers, and smaller tributaries. The major types of water pollutants, the ways in which these substances or their influences are detected in streams, and the social and economic effects resulting from the presence of such contaminants are examined. Although actions to enact and enforce water pollution statutes are underway, both at the State and Federal levels in coordination with an interstate water agency, the Delaware River Basin Commission, the State of Pennsylvania has primary enforcement powers and responsibilities. The Pennsylvania approach features water quality standards based on use, with permits to discharge wastes being issued contingent upon restrictions as to the quantity and character of wastes that may be released. Comprehensive planning must include water quality considerations through such measures as codes and ordinances. Citizen participation in water pollution control is recognized as necessary and guidelines for citizen input are presented. (Hoffman-North Carolina)
W74-01852

A COMPREHENSIVE PLAN FOR THE FOX RIVER WATERSHED: VOLUME ONE: INVENTORY FINDINGS AND FORECASTS.
Southeastern Wisconsin Regional Planning Commission, Waukesha.
For primary bibliographic entry see Field 04D.
W74-01856

A COMPREHENSIVE PLAN FOR THE FOX RIVER WATERSHED: VOLUME TWO: ALTERNATIVE PLANS AND RECOMMENDED PLAN.
Southeastern Wisconsin Regional Planning Commission, Waukesha.
For primary bibliographic entry see Field 04D.
W74-01857

NORTH CAROLINA WATER PLAN--PROGRESS REPORT, CHAPTER 26--BROAD RIVER BASIN--VOL. I.
North Carolina Dept. of Natural and Economic Resources, Raleigh. Office of Eater and Air Resources.
For primary bibliographic entry see Field 06B.
W74-01858

A CONSERVATION ELEMENT FOR THE SACRAMENTO GENERAL PLAN.
Sacramento City Planning Commission, Calif.
For primary bibliographic entry see Field 06G.
W74-01864

WATER QUALITY AND PUBLIC OPINION.
Gallup Poll, Princeton, N.J.
For primary bibliographic entry see Field 06B.

W74-01867

INTERNATIONAL WATER QUALITY LAW,
New Mexico Univ., Albuquerque. School of Law.
A. E. Utton.
National Resources Journal, Vol 13, No 2, p 282-314, April, 1973.

Descriptors: *International law, *Water quality control, *Drainage basins, Pollution, International Joint Commission.
Identifiers: Helsinki Rules, *Equitable utilization, *International drainage basin development.

The formulation of the principles of international law of drainage basins is described. The Harmon Doctrine of absolute territorial sovereignty was only briefly followed. This principle was replaced by the concept of sic utere tuo ut alienum non laedus (so use your property as not to injure your neighbor), and its corollary, limited territorial sovereignty. Following this concept, a riparian would be required to use its part of an international basin so as not to injure its coriparians in any way. This then was refined to the 'fair share' concept of equitable utilization. Benefits gained by use by one nation would be balanced against the cost or damage incurred by other coriparians. The Helsinki Rules of the Uses of the Water of International Rivers, the most definitive expression of international law of rivers, incorporates this principle of equitable utilization. Water quality obligations are articulated in Article X. The weakness of the Helsinki Rules lies in the lack of an administrative process to apply them. Recognizing this, a hierarchical 2-tier approach, where an international commission acts as a catalyst by initiating studies and formulating policy recommendations and disseminating these to cobasin states for adoption and execution, is suggested. Also suggested, but acknowledged somewhat utopian, would be the development of a basin as a unit, without regard to national boundaries according to either the principles of equitable utilization or optimum utilization. (Hoffman-North Carolina)
W74-01869

COALESCING PLATES AND PACKS FOR OIL WATER SEPARATION IN VARIOUS SHIPBOARD APPLICATIONS,
General Electric Co., Philadelphia, Pa. Re-entry and Environmental Systems Div.
J. G. Merryman, and E. R. Osterstock.
Available from NTIS, Springfield, Va 22151 AD-758 319; Price $6.00 printed copy; $1.45 microfiche. Final Contract Report (724305.2/6) to US Coast Guard, January 1973. 180 p, 53 fig, 8 tab. Contract DOT-CG-24290A.

Descriptors: *Oily water, *Separation techniques, *Ships, Methodology, Electrophoresis, Flow rates, Velocity, Temperature, Viscosity, Sludge, Emulsions, Oil spills, Water pollution sources, Data collections, Reviews, Test procedures, Evaluation.
Identifiers: *Oil-water separation methods.

Findings of an evaluation of coalescing plates and packs for oil-water separation in various shipboard applications are documented. Basic parameters of the system were investigated to obtain saturation of limitation trends. There are nine subsections covering separator length and angle, oil concentration, flow velocity, oil type, temperature, emulsification, sludge and solids, ship motions, and electrophoresis. Each of these subsections describes the test objective, how the test was conducted and a discussion/interpretation of the data obtained. (Woodard-USGS)
W74-01882

SUMMARIES OF FOREIGN GOVERNMENT ENVIRONMENTAL REPORTS.
Environmental Protection Agency, Washington, D.C. Library Systems Branch.
Available from NTIS, Springfield, Va 22151, PB-218 839 Price $3.00 printed copy; $1.45 microfiche. Foreign Documents Announcements, No 1, September 1972. 18 p, 31 ref.

Descriptors: *Bibliographies, *Environmental control, *Foreign countries, *Publications, Water pollution sources, Air pollution, Industrial wastes, Municipal wastes, Domestic wastes, Water quality control, Water quality standards, *Water pollution control, Pollutant identification, Chemical analysis, Pollution abatement, Documentation, Abstracts, Information retrieval, Foreign projects, Foreign research.
Identifiers: *Environmental reports, Foreign governments.

Under a series of documents exchange agreements with environmental agencies in other countries, the U.S. Environmental Protection Agency (EPA) is building a collection of environmental reports issued by foreign governments and international organizations. This annotated bibliography is the first in a series of announcements of foreign documents received. A computerized search system is being developed which will allow future retrieval of these summaries by country, subject area, and type of document. Ultimately, EPA plans to assemble a major collection of foreign government environments documents and to develop several approaches to the dissemination of this information to EPA staff. (Woodard-USGS)
W74-01886

CONTROL OF FOULING OF REVERSE OSMOSIS MEMBRANES WHEN OPERATING ON POLLUTED SURFACE WATERS,
Gulf Environmental Systems Co., San Diego, Calif.
For primary bibliographic entry see Field 03A.
W74-01908

OYSTER DRILL (OCINEBRA JAPONICA) CONTROL,
Washington State Dept. of Fisheries, Olympia.
J. Chambers, M. Fraidenburg, and T. A. Mecklenburg.
Available from NTIS, Springfield, Va 22152, COM-72-11324, Price $3.00 printed copy, $1.45 microfiche. Washington Department of Fisheries Completion Report to NOAA, National Marine Fisheries Service for the period May 1967-June 1971, March 1972. 70 p.

Descriptors: *Fisheries, *Pest control, *Shellfish, *Oysters, *Washington, Worms, Testing procedures, Barriers, Attractants, Chemicals, Reviews, Evaluation, Water quality control, Data collections.
Identifiers: *Japanese oyster drill (Ocinebra japonica).

The Japanese oyster drill is one of the most destructive oyster predators in the State of Washington. Attempts to find means of controlling the pest by attractants, barriers, and chemicals are described. Attractants produced little or no sustained results. Barriers of chemically impregnated grease were effective up to 5 months in the field, but required periodic cleaning. The chemicals tested did not demonstrate a drill-specific toxicant. Egg capsules were destroyed by a 50% dilution of sulfuric acid and water. (See also W74-01918 and W74-01919) (Woodard-USGS)
W74-01917

FLUOROPHENE, A POSSIBLE CONTROL OF JAPANESE OYSTER DRILLS ON OYSTER GROUNDS,
Washington State Dept. of Fisheries, Olympia.
J. Chambers, M. Fraidenburg, and W. Hoffman.
In: Oyster Drill (Ocinebra Japonica) Control, Washington Department of Fisheries Preliminary Report to NOAA, National Marine Fisheries Service, July 1971, p 12-35. 9 tab, 2 ref. NOAA Contract 14-17-0001-2309.

Descriptors: *Fisheries, *Pest control, *Shellfish, *Oysters, *Washington, Testing procedures, Chemicals, Worms, Water quality control, Evaluation, Data collections.
Identifiers: *Japanese oyster drill (Ocinebra japonica).

Fluorophene, which has proven lethal to Japanese oyster drills at 250 ppm in the laboratory and live-box field tests, was applied at the rate of 58 lb/acre to two 1,600 sq ft plots in an oyster dike during low tide. The mid-July treatment produced 88.3% mortality among the 67% recovered marked drills, with 96.6% of the deaths occuring in 15 days. Treatment of the second plot, in mid-August, occurred at the onset of fall spawning, and resulted in 12.4% mortality of the 46.7% of the treated drills recovered. A pronounced movement of drills occurred with most of the recoveries from outside the plot and the major movement toward the upper dike. Water currents and metabolites from ripening drills in the upper dike and the dike wall are believed to have influenced the direction of movement. The low recovery and mortality rates can be attributed to spawning activity. No recently dead oysters, clams, mussels, or slipper shells were found in the samples taken from the plots and no significant kills were found among the heavy populations of shore crabs in the dike. No dead were found among the 42% or marked drills recovered from the control for the Plot 2. (See also W74-01917) (Woodard-USGS)
W74-01918

OYSTER DRILL INVESTIGATIONS,
Washington State Dept. of Fisheries, Olympia.
J. Chambers, M. Fraidenburg, T. A. Mecklenburg, and W. Hoffman.
In: Oyster Drill (Ocinebra Japonica) Control, Washington Department of Fisheries Completion Report to NOAA, National Marine Fisheries Service, March 1972, p 36-54. 11 tab, 7 ref. NOAA 14-17-0001-2309.

Descriptors: *Fisheries, *Pest control, *Oysters, *Shellfish, *Washington, Worms, Testing procedures, Barriers, Attractants, Chemicals, Data collection, Reviews, Evaluation, Water quality contol.
Identifiers: *Japanese oyster drill (Ocinebra japonica).

In the state of Washington, three approaches to controlling Japanese oyster drills (attractants, barriers, and chemicals) failed to yield a satisfactory acceptable control. Chemical controls are possible but have so far not been found practical or acceptable. Chemicals tested that killed drills at relatively low concentrations were highly lethal to other marine organisms. Fluorophene, the chemical that holds the most promise among those tested is expensive, practically insoluble in seawater, and requires a relatively high concentration to kill drills. However, the use of a 50% dilution of sulfuric acid in water could facilitate the destruction of egg capsules on dry surfaces or by immersing capsules picked from dike walls and shells. (See also W74-01917) (Woodard-USGS)
W74-01919

WATER QUALITY AND WASTE ASSIMILATIVE CAPACITY OF THE PEARL RIVER BELOW BOGALUSA, LOUISIANA,
Geological Survey, Baton Rouge, La.
For primary bibliographic entry see Field 05B.
W74-01922

ANALYSIS OF COAL REFUSE DAM FAILURE, MIDDLE FORK BUFFALO CREEK, SAUNDERS, WEST VIRGINIA--VOLUME 2, APPENDICES.
Wahler (W.A.) and Associates, Palo Alto, Calif.
For primary bibliographic entry see Field 08A.
W74-01939

BASIC DIRECTIONS OF SCIENTIFIC INVESTIGATIONS IN THE PROTECTION OF SURFACE WATERS FROM POLLUTION (OKHRANA POVERKHNOSTNYKH VOD OT ZAGRYAZNENIYA (OSNOVNYYE NAPRAVLENIYA NAUCHNYKH ISSLEDOVANIY)),
Akademiya Nauk SSSR, Moscow, Institut Vodnykh Problem.
For primary bibliographic entry see Field 05B.
W74-01967

SCIENTIFIC PRINCIPLES OF WATER LEGISLATION (NAUCHNYYE OSNOVY VODNOGO ZAKONODATEL'STVA),
For primary bibliographic entry see Field 06E.
W74-01968

USE AND CONSERVATION OF WATER RESOURCES IN THE UKRAINE (ISPOL'ZOVANIYE I OKHRANA VODNYKH RESURSOV V UKRAINSKOY SSR),
For primary bibliographic entry see Field 05D.
W74-01971

SOME NATURAL PHYSICAL PROCESSES AFFECTING THE RECOVERY OF THE GREAT LAKES,
Ohio State Univ., Columbus.
For primary bibliographic entry see Field 05B.
W74-01974

WATER POLLUTION CONTROL ACROSS THE NATION,
C. Lewicke.
Environmental Science and Technology, Vol 7, No 9 p 786-792, September, 1973. 1 fig, 1 tab.

Descriptors: *Water pollution, *Water quality control, *Comprehensive planning, Financing, Coordination, Administration, Planning, State governments.
Identifiers: *Basin planning, State-Federal relations.

A survey is presented of complaints by state environmental quality control officials against the Federal Water Pollution Control Act Amendments of 1972. Half the states responded in some way to the inquiries. Serious hindrances to clean water in the states included insufficient funding, lack of Federal direction on the 1972 amendments, lack of manpower, nonpoint source pollution, high costs of waste collection and treatment in small communities, basin planning problems, and excessive paper work. Other serious hindrances were the inability of the federal government to agree on tradeoffs between increased federal subsidies and their inflationary effects on the economy, lack of state land-use control, problems in small states of establishing a clear-cut water pollution control program, lack of effective data management systems, and the philosophy of treating symptoms of a problem rather that the problem itself. States view basin planning requirements as onerous. Degrees of interstate cooperation to achieve water quality are surveyed. The status of water quality monitoring programs is considered. Specific water pollution problems in 19 states are listed. State provisions for wetland and coastal zone management are sketchily summarized. Officials of some states believe the goals for clean water in the 1972 amendments are realistic, while others believe they are achievable only in part. (Stein-North Carolina)
W74-01975

THE USE OF ARTIFICIAL POOLS IN ASSESSING POPULATIONS OF THE MOSQUITO CULEX RESTUANS THEOBALD,
Department of Agriculture, Belleville (Ontario). Research Inst.
M. G. Maw, and G. K. Bracken.
Proc Entomol Soc Ont. 102 p, 78-83. 1971 (1972). Illus.
Identifiers: *Artificial pools, Assessment, *Canada (Ontario), Capric acid, Culex-pipiens, Culex-restuans, Density, *Mosquito populations, *Pseudomonadaceae, Bacteria.

Artificial pools containing water borne bacteria of the family Pseudomonadaceae and treated with capric acid and NH4NO3 are attractive oviposition sites for 2 of the Ontario, Canada species of Culex mosquitoes (C. pipiens and, particularly C. restuans). Large (1 m2) pools collect more rafts than small (0.09 m2) pools and are slightly more efficient at low population densities. However, the smaller pools are as effective as the large for monitoring Cultex populations for the bulk of the season and are easier to install, maintain and service. Location of the pools (low damp areas along a stream course being best) is important if they are to optimal indications of population density.--Copyright 1973, Biological Abstracts, Inc.
W74-01987

SUCTION OIL DECANTER,
Cities Service Oil Co., Tulsa, Okla. (Assignee).
E. A. Bell, and T. F. Padden.
U. S. Patent No. 3,760,944, 4 p, 4 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 914, No 4, p 1291, September 25, 1973.

Descriptors: *Patents, *Oil spills, *Oil pollution, *Pollution abatement, Equipment, Water pollution control, Water quality control.
Identifiers: *Decanting.

An apparatus for the removal of an oil slick from a body of water comprises a covered housing adapted to be positioned on a body of water and having an opening in at least one side. Within the housing are means for drawing air along the surface of the water through the housing and means for withdrawing accumulated oil from the housing. Air is drawn through the housing by an air blower connected to an air conduit, the other end of which is connected to the top of the housing. A gate may be pivotally attached to the top of the opening in the side of the housing so as to regulate the flow of air. (Sinha-OEIS)
W74-02026

THE REMOVAL OF SURFACE LAYERS FROM LIQUIDS,
Megator Pumps and Compressors Ltd., London (England). (Assignee).
F. W. McCombie.
U. S. Patent No. 3,759,390, 3 p, 4 fig, 6 ref; Official Gazette of the United States Paetent Office, Vol 914, No 3, p 910, September 18, 1973.

Descriptors: *Patents, *Oil spills, Water pollution control, Water quality control, *Pollution abatement, *Oil pollution, Equipment, *Separation techniques.

The apparatus comprises a chamber capable of floating on a liquid. There is an inlet at the upper surface through which the surface layer can enter the interior of the chamber. An outlet defines a balancing chamber, through which liquid can be drawn upward from the lower part of the chamber to a source of suction. The outlet consists of at least one pipe leading upward from the inlet and then downward in the form of an inverted V wide enough to straddle any boom or interceptor used to contain the oil (or other unwanted liquid), the downward ends are connected to a floating manifold or elbow from which a hose connects to the source of suction, and a flotation device such that the apparatus floats with the inlets above the surface of the liquids when needed. (Sinha-OEIS)
W74-02030

FLOATING BOOM STRUCTURES,
Barracudaverken A.B., Gamleby (Sweden). (assignee).
E. J. Larsson.
U. S. Patent No. 3,757,526, 3 p, 4 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 914, No 2, p 448, September 11, 1973.

Descriptors: *Patents, *Oil spills, *Oil pollution, Water quality control, Water pollution control, *Pollution abatement, Equipment.
Identifiers: *Booms.

The boom consists of two superimposed sheets of plastic foil material which are welded together at a number of sequentially arranged points in the longitudinal direction of the boom to form rectangular closed pockets located on the upper half of the boom when in use. Each pocket contains one filing body which extends the pocket to form a buoyant body of requisite buoyancy. The filling body is constructed of corrugated cardboard. The boom is held in a vertical position when afloat in the water. (Sinha - OEIS)
W74-02036

FLOATING BARRIER FOR CIRCUMSCRIBING OIL POOLS OR LIKE REFUSE,
M. A. Belin.
U. S. Patent No. 3,739,584, 3 p, 4 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 911, No 3, p 818, June 19, 1973.

Descriptors: *Patents, *Oil spills, *Oil pollution, *Pollution abatement, Equipment, Water quality control, Water pollution control.

A floating barrier for circumscribing and trapping oil films or like refuse in harbors and other bodies of water comprises a strip of noncorrodible material such as stainless steel and a pair of buoyant floats removably fitted at intervals on opposite sides of the strap so as to support it vertically in the body of water. Junction means interconnect the floats pairwise and can be engaged through the strip. A pair of watertight stabilizing compartments is removably secured to opposite sides of an end portion of the strip and can be connected to a hauling or towing craft. (Sinha - OEIS)
W74-02037

PRELIMINARY TRIALS WITH HERBICIDES IN IRRIGATED ONIONS AT SAMARU, NIGERIA,
Institute for Agricultural Research, Zaria (Nigeria).
For primary bibliographic entry see Field 03F.
W74-02079

PESTS, CROP DAMAGE AND CONTROL PRACTICES WITH IRRIGATED COTTON IN A TROPICAL ENVIRONMENT,
Commonwealth Scientific and Industrial Research Organization, Canberra (Austrailia). Div. of Land Research.
A. G. L. Wilson, J. J. Basinski, and N. J. Thomson.
Cotton Grow Rev. Vol 49, No 4, p 308-340. 1972. Illus.
Identifiers: *Austrailia (Ord River Valley), Control, *Cotton, Crop damage, Fertilizers, Insects, Insecticides, Irrigated, Nitrogen, *Parathion, Pests, Tropical environment.

An evaluation over 2 seasons of the effects of progressive delays in commencing complete insect protection (parathion spray) on cotton crops and also of the effects of intermittent protection on yield and quality was made at Kimberley Research Station, inthe Ord river valley, Western Australia. Progressive delay in protection until 12 wk after sowing did not adversely affect yields but in the second season there was a significant yield reduction if control was delayed until 16 wk. However, this reduction did not occur with an equally

delayed treatment to which N fertilizer application was made shortly before commencement of protection, and a beneficial effect was noted with the longest delayed protection treatment with late N application in the first season. Yields were reduced between 20 and 40% in the intermittently sprayed treatments, compared with the mean of the protected treatments. Fiber quality of the later-protected treatments where boll development was displaced into the cooler winter months was adversely affected, particularly as regards staple length and micronaire value. The overall agronomic implication of delays in imposing insect control on irrigated cotton crops in the Ord valley was discussed. A reduction in numbers of spray applications could be achieved by delaying protection against pests until after the wet season; staggering the date at which protection commenced would make possible the more economic use of labor and machinery.--Copyright 1973, Biological Abstracts, Inc.
W74-02093

ENVIRONMENTAL SCIENCE TECHNOLOGY INFORMATION RESOURCES,
For primary bibliographic entry see Field 06G.
W74-02100

PAST AND CURRENT RESEARCH ON DISEASES OF EURASIAN WATERMILFOIL (MYRIOPHYLLUM SPICATUM L.),
Florida Univ., Gainesville. Dept. of Plant Pathology.
For primary bibliographic entry see Field 02I.
W74-02112

REGIONAL LAND USE PLAN, 1973, FOR HANCOCK, HARRISON, PEARL RIVER, JACKSON COUNTIES, MISSISSIPPI.
Gulf Regional Planning Commission, Gulfport, Miss.
For primary bibliographic entry see Field 04A.
W74-02120

MUNCIE INDIANA'S 'TOTAL' LOCAL WATER QUALITY PROGRAM,
Muncie Sanitary District, Ind. Water Quality Div.
For primary bibliographic entry see Field 05B.
W74-02132

MUNCIE SANITARY DISTRICT, 1972, 8TH ANNUAL REPORT.
Muncie Sanitary District, Ind.
For primary bibliographic entry see Field 05D.
W74-02133

06. WATER RESOURCES PLANNING

6A. Techniques of Planning

STUDIES IN THE ANALYSIS OF METROPOLITAN WATER RESOURCE SYSTEMS-VOLUME VII: CONFLICT AND CHOICE: MULTIOBJECTIVE WATER--RESOURCES PLANNING,
Cornell Univ., Ithaca, N.Y.
D. A. Haith, and D. P. Loucks.
Available from the National Technical Information Service as PB-225 830, $3.75 in paper copy; $1.45 in microfiche. New York Water Resources and Marine Sciences Center, Ithaca, Technical Report 68, 1973. 90 p, 11 fig, 11 tab, 46 ref. OWRR C-3101 (no 3684) (3).

Descriptors: *Decision making, *Optimization, Comparative benefits, Efficiencies, *Multiple purpose, *Planning, Political constraints, Project feasibility, Systems analysis, *Simulation analysis, *Mathematical models, *Urbanization.

The study deals with the application of mathematical modelling to multi-objective water resources planning. Such planning is seen as the selection and quantification of the various planning objectives, the formulation of technologically feasible plans which are efficient in the Pareto sense and finally screening of plans for political feasibility. Aspects of political decision-making which are relevant to multiobjective planning are reviewed, as are current Federal guidelines for multi-objective planning and techniques for quantifying water-resource planning objectives. A general framework for the application of mathematical models to multiobjective planning is developed. Optimization and simulation models are seen as useful in two planning stages. In the plan formulation stage, models can be used to generate efficient plans incorporating a range of possible tradeoffs among objectives. In the plan selection stage, models which require decision-maker interaction and/or subjective data from the planner may be used to screen plans for political feasibility. Examples and case studies of both types of applications are presented.
W74-01784

ECONOMICS OF MARINE RESOURCES DECISION MODEL,
California Univ., Santa Barbara. Marine Sciences Inst.
J. J. Sullivan.
In: Final Report 'Multiple Uses of Santa Barbara Channel Marine Resources,' p 30-60, 1971. 7 fig. NSF GH 95.

Descriptors: *Decision making, *Model studies, *Economic impact, *Coasts, Land use, Population, Water pollution, Air pollution, Costs, Cost-benefit analysis, Environment, Sewage disposal, Evaluation, Planning, *California.
Identifiers: *Santa Barbara (Calif), *Coastal zone development, Sea coast planning, Marine resources.

The overall purposes of the interdisciplinary project is the development of an environmental decision submodel, which, in combination with the results of several other subprojects, is intended to aid in the formulation of a Seacoast General Plan. The current procedure for fulfilling this purpose consists of two steps: (1) continued research to identify and measure variables which could be used to determine the economic impacts of marine resource use as well as the specification and programming of a decision model, and (2) use of the decision model to measure impacts of alternative decisions. Additionally, the completed model could be used to train people to make environmentally and economically sound decisions concerning marine resources. Major accomplishments as of September 1, 1971 include a cost computation model, a preliminary marine resources model, an extensive enumeration of the impacts and costs of alternative environmental resource uses, and a book-length manuscript specifying variables relevant to the model. A seacoast planning project has attempted to formulate a plan and decision procedure whereby university research and county level seacoast planning could be coordinated. (Weaver-Wisconsin)
W74-01837

REPORT ON THE HARVARD PROGRAM OF RESEARCH IN WATER RESOURCES DEVELOPMENT,
Harvard Univ., Cambridge, Mass.
For primary bibliographic entry see Field 06B.
W74-01846

A METHODOLOGY FOR DETERMINING OPTIMAL LONGITUDINAL SPACING OF EFFLUENT DISCHARGES INTO A RIVER,
Massachusetts Univ., Amherst. Dept. of Industrial Engineering and Operations Research.
For primary bibliographic entry see Field 05B.
W74-01928

MULTI-TIME PERIOD FACILITIES LOCATION PROBLEMS: A HEURISTIC ALGORITHM WITH APPLICATION TO WASTE WATER TREATMENT SYSTEMS,
Massachusetts Univ., Amherst. Dept. of Industrial Engineering and Operations Research.
For primary bibliographic entry see Field 05D.
W74-01929

OPTIMAL ALLOCATION OF WATER RESOURCES IN UTAH,
Utah Water Research Lab., Logan.
For primary bibliographic entry see Field 04A.
W74-02117

6B. Evaluation Process

THE ECONOMIC IMPACT OF BEAVER LAKE RESERVOIR: A COST BENEFIT STUDY,
Arkansas Univ., Fayetteville. Dept. of Economics.
D. Market.
Available from National Technical Information Service as PB-225 472/0 $5.50 in paper copy; $1.45 in microfiche. Arkansas Water Resources Research Center Publication No. 14, 1973. 217 p, 41 fig, 72 tab, 33 ref. OWRR B-024-ARK (1), 14-31-0001-3558.

Descriptors: *Economic impact, Recreation demand, Economic efficiency, Growth, Income, *Arkansas, *Cost-benefit analysis, *Net income, Industries, *Post impoundment.
Identifiers: *Beaver Lake Reservoir (Ark), Recreational benefits, Personal income.

This study was undertaken to determine the impact of Beaver Lake Reservoir on four contiguous Arkansas counties. Analysis of economic data indicated that lake related personal income in the area has, since the project was completed, been about 2.5% higher than it would have been had the lake not been constructed. The greatest impact has been associated with the counties having the largest share of the shore line. In the aggregate, however, the most significant cause of economic growth in the area has been associated with growth of manufacturing employment. Also the relative economic position of each of the counties remained virtually unchanged since the project was undertaken. From the viewpoint of economic efficiency, revenues to the Federal Government attributable to the project have been sufficient to result in the project having a net annual yield of 2.8 percent even without considering the 'free' recreational benefits of the lake.
W74-01652

ARID URBAN WATER MANAGEMENT: SOME ECONOMIC, INSTITUTIONAL AND PHYSICAL ASPECTS,
Nevada Univ., Reno. Desert Research Inst.; and Nevada Univ., Reno. Center for Water Resources Research.
G. F. Cochran, and W. C. Wilson.
Available from the NTIS as PB-225 511/5 $3.50 in paper copy, $1.45 in microfiche. Technical Report Series H-W, Hydrology and Water Resources Publication No. 11, November 1971. 62 p, 20 fig, 26 tab, 25 ref, 2 append. OWRR C-1872 (No 3173) (1).

Descriptors: *Conjunctive use, *Water rates, *Dynamic programming, *Water policy, Groundwater mining, Safe yield, Pricing, Political aspects, Institutions, *Nevada, *Colorado River, *Water management (Applied), Land use, Arid lands.
Identifiers: *Las Vegas Valley (Nev).

This is the second report on a study entitled, 'Research and Analysis to Plan, Develop and Manage a Ground and Surface Water Supply.' The study area is the Las Vegas Valley in southern Nevada which has a ground- and surface-water

supply system. Possible future population growth and water requirements for the area are examined. Water use projections are based on type of use and area of use predicted on land use plans and economic relationships. Area water pricing schemes are examined to disclose possible inequities in burden carried by various used groups to amortize water facilities and pay operating costs. The pricing mechanism is examined as a means of controlling water usage and providing equitable cost distribution. Water related institutions extant are examined in light of their apparent ability to exercise optimal or near optimal control over the water resources systems. An alternative institution is proposed which would enhance control and optimal use of available resources. Models of the various physical components of conjunctive water resource system are presented and are discussed in relationship to current institutional controls. It is demonstrated that current contractural agreements are neither optimal in terms of management of the physical system nor completely equitable in the distribution of costs of system operation.
W74-01662

STUDIES IN THE ANALYSIS OF METROPOLITAN WATER RESOURCE SYSTEMS-VOLUME VII: CONFLICT AND CHOICE: MULTIOBJECTIVE WATER--RESOURCES PLANNING,
Cornell Univ., Ithaca, N.Y.
For primary bibliographic entry see Field 06A.
W74-01784

HAWAII'S SYSTEM OF WATER RIGHTS: AN ECONOMIC EVALUATION,
Hawaii Univ., Honolulu. Water Resources Research Center.
For primary bibliographic entry see Field 06E.
W74-01785

RESOURCE ALLOCATION IN A NON-CONVEX ECONOMY,
Purdue Univ., Lafayette, Ind.
J. C. Moore, A. B. Whinston, and J. S. Wu.
Review of Economic Studies, Vol 39, No 19, p 303-323, 1972. 6 fig, 27 ref.

Descriptors: *Economic efficiency, *Resource allocation, Theoretical analysis, Welfare, Mathematical models, Model studies.
Identifiers: *Non-convex production sets, *Pareto optimality, Competitive equilibrium.

In order to develop a more realistic model of production the occurrence of increasing returns and indivisibilities in production technology must be introduced by relaxing the assumption of convexity for production sets. Issues in resource allocation raised by this more realistic model are discussed. Principal among these issues is the relationship between Pareto optimality and competitive equilibria. Although this relationship is well defined for assumptions of convexity, the objective is to derive the necessary and sufficient conditions characterizing the coincidence of a Pareto optimal allocation and a competitive equilibrium. Based upon an Arrow-Debreu model of a competitive economy, conditions for Pareto optimality, and competitive and valuation equilibrium are defined first for assumptions of convex production sets. Next, a non-convex production set (increasing returns) is assumed and two examples are used to illustrate that the relationship of a Pareto optimal allocation and a valuation (or competitive) equilibrium is dependent upon the initial resource endowment. This point is reiterated more precisely with the aid of a welfare resource epigraph of economy. (Weaver-Wisconsin)
W74-01829

EVALUATING WATER BASED RECREATION FACILITIES AND AREAS,
North Carolina State Univ., Raleigh. Dept. of Recreation and Park Administration.
C. C. Stott.
National Recreation and Park Association, Washington, D.C. Bulletin No 70, 1967. 48 p.

Descriptors: *Recreation facilities, *Evaluation, *Water sports, Water quality, Standards, Access routes, Road design, Operation and maintenance, Aesthetics, *Swimming, *Boating, Water utilization.
Identifiers: Parking, *Picnic areas.

Criteria to aid in the evaluation of the quality of current water based recreation facilities are presented along with standards for evaluation of their present and future operations and developments. Consideration is limited to day use facilities with special emphasis on site selection, design and construction, and maintenance of swimming, picnicking, and boating facilities. Thus, both function and aesthetic characteristics of the facilities may be evaluated. Evaluation of any particular project is accomplished by answering an appropriate set of questions included and utilizing an evaluation score sheet found in the appendix. This technique may be of use to park and recreation administrators, private developers, or park and recreation planners. (Weaver-Wisconsin)
W74-01831

FLOOD MITIGATION VERSUS POPLAR GROWING AS ALTERNATIVE PUBLIC INVESTMENTS: A CASE STUDY,
V. Ramasamy, and J. A. Sinden.
Journal of the Australian Institute of Agricultural Science, p 182-184, September 1972. 2 tab, 5 ref.

Descriptors: *Economics, *Flood control, *Dairy industry, *Lumber, Income, Cost-benefit ratios, Financing, *Australia, Investment.
Identifiers: *Poplars.

Alternative public investments aimed at improving low dairy farm incomes in New South Wales, Australia were studied. Net present value and benefit-cost criteria were employed to evaluate the efficiency of three types of land use: dairying, dairying with flood mitigation investments, or with investments in poplar growing. Returns to dairying were calculated for prevailing world market prices and subsidized prices. In addition, two standards of management were considered. Poplar investment on a 18-year rotation with one acre being felled per year was assumed. Both basic and optimistic yields were considered along with returns from crops grown between the trees during the first two years and livestock grazing for the next nine years. For flood mitigation levee banks and spillways would be constructed. Results indicate that profitability of average poplar production is greater than that of efficiently managed farms with flood mitigation investments even if pessimistic prices and the lowest poplar yields are assumed. However, benefit-cost ratios show flood mitigation preferable by 5% in this latter case. (Weaver-Wisconsin)
W74-01832

POLLUTION ABATEMENT AND UNEMPLOYMENT. A METHODOLOGICAL STUDY,
Institute of Public Administration, Washington, D.C.
For primary bibliographic entry see Field 05G.
W74-01835

ECONOMICS OF MARINE RESOURCES DECISION MODEL,
California Univ., Santa Barbara. Marine Sciences Inst.
For primary bibliographic entry see Field 06A.
W74-01837

COST BENEFIT STUDIES OF IRRIGATION PROJECTS AND SUGGESTIONS FOR THEIR IMPROVEMENT,
Central Water and Power Commission, New Dehli (India).
For primary bibliographic entry see Field 03F.
W74-01842

A STUDY OF THE ECONOMIC IMPACT ON THE STEEL INDUSTRY OF THE COSTS OF MEETING FEDERAL AIR AND WATER POLLUTION ABATEMENT REQUIREMENTS. PART III.
Booz-Allen Public Administration Services, Inc., Washington, D.C.
For primary bibliographic entry see Field 05G.
W74-01844

STANDARDS AND CRITERIA FOR FORMULATING AND EVALUATING FEDERAL WATER RESOURCES DEVELOPMENTS,
Bureau of the Budget, Washington, D.C.
M. M. Hufschmidt, J. Krutilla, J. Margolis, and S. A. Marglin.
In: U S Congress Joint Economic Committee. Hearings before the Subcommittee on Economy in Government. 91st Cong, 1st Session. May 12 and 14, 1969. Appendix I, p 135-212, (1969). 1 tab.

Descriptors: Water resources, *Water resources development, *Planning, Discount rates, Interest rates, Risks, Alternative costs, Recreation, Financing, Investment, *Standards, *Evaluation, Model studies.
Identifiers: *Public investment model, Secondary benefits, Investment decision process, *Criteria.

Specific areas related to the adoption of standards and criteria for formulating and evaluating Federal water resource developments are discussed including: (1) the basic framework for water resource development, (2) the interest or discount rate, (3) secondary benefits, (4) risk and uncertainty, (5) use of alternative costs in formulating and evaluating hydropower projects, (6) recreation and fish and wildlife values, (7) financial policy, including cost sharing and cost allocations, and (8) the investment decision process. Standards and criteria were viewed as a part of a larger investment decision process for Federal public works. Conclusions and recommendations suggested that an interim set of revised standards and criteria should be issued, followed by a more detailed set in the context of the overall investment-decision process and framed in terms of all relevant objectives of public policy. The interest or discount rate to be used in economic analysis should reflect the Administration's social rate of time discount, to be used in conjunction with a cutoff benefit-cost ratio. Income gains and losses from external economies and diseconomies should be included, and benefits for objectives other than national income must be identified. Cost offsets should be used in plan formulation in situations of secular unemployment. Adjustments for risk in individual projects should be reflected in benefit estimates. The period of analyses should be the lesser of the economic life of the project features or 100 years. Where there are specific public income redistribution objectives at hand, cost-sharing and repayment policy should be related to these. Conclusions about the investment decision process are also offered. (Edwards-North Carolina)
W74-01845

REPORT ON THE HARVARD PROGRAM OF RESEARCH IN WATER RESOURCES DEVELOPMENT,
Harvard Univ., Cambridge, Mass.
A. Maass, and M. M. Hufschmidt.
In: Resources Development: Frontiers for Research; papers of the Western Resources Conference, 1959, F. S. Pollak editor. University of Colorado Press, Boulder, p 133-179, 1960. 10 fig.

Descriptors: Water resources, Methodology, *Design criteria, Design, *Simulation analysis, *Mathematical models, *Idaho, Multiple purpose, *Planning, Optimization.
Identifiers: *Harvard Water Resources Program, System design, *Clearwater River (Idaho).

Methodology developed in the Harvard Water Resources Program for the planning and design of multi-unit, multi-purpose water resource systems is presented. Objectives were to allow the simultaneous consideration of a large number of alternative system designs, to effect improvements in planning river systems so as to 'marry' engineering and economics, and to be adaptable to any reasonable economic objective and institutional constraints. Potential objectives such as economic efficiency, employment, income redistribution, economic growth, and other intangible ones, are discussed with respect to their conversion into objective functions or design criterion. The optimal system design will be that combination of system units and outputs for which the net benefits are maximized subject to whatever constraints are imposed. The application of formal conditions necessary to achieve this design is explained. Also described are efforts at simulation of a river system--with hydrology based on the Clearwater River in Idaho--on a digital computer. Input variables are system units and target outputs. The results are given as gross and net benefits expressed in dollars. Limitations of simulation are discussed. The utility of mathematical models for deriving optimum size of units, optimal output, and an optimal operating procedure are explored in detail. Political decisions about the objective (s) to be maximized are important. (Edwards-North Carolina)
W74-01846

THE NATIONAL WATER COMMISSION REPORT: A REVIEW,
Arizona Univ., Tuscon. Inst. of Government Research.
For primary bibliographic entry see Field 06E.
W74-01853

NORTH CAROLINA WATER PLAN--PROGRESS REPORT, CHAPTER 26--BROAD RIVER BASIN--VOL. I.
North Carolina Dept. of Natural and Economic Resources, Raleigh. Office of Eater and Air Resources.

Draft Report May, 1973. 132 p, 19 fig, 38 tab, 75 ref, 5 append. Supported in part by the Water Resources Council.

Descriptors: *River basin development, *Resources, Pollutants, Water quality control, Water quality standards, Precipitation (Atmospheric), Treatment facilities, Hydrology, *North Carolina.
Identifiers: *Broad River Basin (N.C.).

The general physical nature of the Basin, plus projections of population, employment, income, industry, and agriculture are presented. Some major conclusions are: the Basin receives abundant precipitation (averaging 52 inches) evenly distributed over the year; most streams have their headwaters in the Appalachian Mountains where runoff averages 1.6 cfsm; ground water can be tapped in most parts of the Basin, with the highest yielding wells in the eastern sector. Nine categories of water use are detailed. The largest use during 1971 was for steam electric power generation, with an average use of 280 mgd for cooling purposes. Major water pollution sources are described. Specific point sources of pollution are given in an appendix. Streams and rivers are near saturation of dissolved oxygen, slightly acid by nature, and of very low alkalinity. Extensive pollution is found in Cleghorn Creek, Vaughn Creek, Brushy Creek, and Buffalo Creek, as well as other streams. The criteria used to evaluate water quality are: (1) documented violations of state water quality standards, (2) occurrences of water pollution which have prevented use of water, and (3) existence of large amounts of untreated or uncontrolled wastes entering the waterways of the Basin. Water control and power structures are described as small-scaled. The largest reservoir or lake has a surface area of 900 acres. Public and industrial water supply facilities are inventoried. (Hoffman-North Carolina)
W74-01858

NORTH CAROLINA WATER PLAN-PROGRESS REPORT: CHAPTER 44, THE APPALACHIAN REGION IN NORTH CAROLINA.
North Carolina State Dept. of Water and Air Resources, Raleigh.

Draft Report August, 1970. 80 p, 13 plates, 16 tab, 63 ref, 8 append. Supported in part by Water Resources Council.

Descriptors: *Planning, Water resources development, *North Carolina, *Federal project policy, *Appalachian Mountain Region, Coordination, *Regional development.
Identifiers: *Federal-state water development coordination, Appalachian redevelopment act.

The Appalachian Region contains 29 counties located in the Blue Ridge and Piedmont physiographic regions, drained by the Kanawha, Yadkin, Santee, and Tennessee River systems. Pertinent sections of the Appalachian Regional Development Act of 1965 are reproduced. Secion 203 (a), which provides for a program of land stabilization, conservation, and erosion control, and Section 212 (a), which provides supplemental grants for waste treatment systems, were utilized for stream flow quality improvement and reducing stream pollution. Summaries of the program by county and by practice are included. State participation in the Appalachian Water Study is outlined, including statements and conclusions generated by North Carolina concerning the problems and priorities of water resources in the Appalachian Region Counties. Development of the Upper French Broad Valley was the paramount concern. Recommendations of the Federal Report concerning North Carolina are delineated by project, status, and purpose. Tabular information relating to costs, benefits, allocation between purposes, project financial costs, apportioned construction costs, and apportioned project operations costs are included for the Clinchfield, Roaring River, and Upper French Broad Projects, which were recommended for early action. The Reddies River Project, specified as a prerequisite project for the Roaring Rivers Project, is included as an early construction priority. Statements of intent by North Carolina concerning these projects are summarized. Detailed cooperative planning, including both interstate and intrastate efforts, is mandatory. (Hoffman-North Carolina)
W74-01859

NORTH CAROLINA WATER PLAN-PROGRESS REPORT CHAPTER 25, THE CONCEPT OF BASIN AND REGION REPORTS IN THE NORTH CAROLINA WATER PLAN.
North Carolina State Dept. of Water and Air Resources, Raleigh.

Draft Report May, 1971. 117 p, 47 plates, 6 tab, 15 ref, 11 append. Supported in part by Water Resources Council.

Descriptors: *River basins, *Planning, *North Carolina, Federal project policy, Piedmont, Watersheds, *Appalachian mountain region, *Regional development.
Identifiers: *Planning units, Multi-county planning regions.

Federal water resource development plans are usually prepared around partial or complete river basin units. In the North Carolina area, these include the Ohio River Basin, the Tennessee Valley Region, the South-Atlantic Gulf Region, the Appalachian Region, and the Coastal Plains Region. Although downstream effects verify the desirability of considering river basins as units, appropriate economic and political boundaries are seldom congruent. North Carolina delineates not only river basin areas but also multi-county planning regions. These are identified by various geographic and hydrolic considerations necessary for preparation of the North Carolina Water Plan and are detailed by individual descriptions and maps. In considering the choice of regions (basin or non-basin) for the North Carolina Water Plan, weight was given to: (1) the existence of 'river basins' with well understood boundaries which by logic or custom have become accepted, and for which data have been accumulated, (2) the existence of river basins or non-river basin regions which are given special attention through Federal agencies, and (3) the existence of special state-sponsored planning areas or of relatively small intra-state Federal study areas which have generated interest. (Hoffman-North Carolina)
W74-01860

NORTH CAROLINA WATER PLAN PROGRESS DURING F.Y. 1973.
North Carolina Dept. of Natural and Economic Resources, Raleigh. Office of Water and Air Resources.

July, 1973. 25 p, 2 append. Supported by Water Resources Council.

Descriptors: *Planning, *Administration, *Budgeting, Data collections, Data storage and retrieval, Personnel, Programs, Cooperation, Publications, North Carolina.
Identifiers: *North Carolina Water Plan.

This semi-annual report to the Water Resources Council under the Water Resources Planning Act includes a summary of the activities of the Planning Division of the Office of Water and Air Resources during fiscal year 1973, a review and analysis of these activities, a work plan for fiscal year 1974, and several appendices covering organization, budgets, salaries, publications, meetings, and the status of the North Carolina Water Plan. Activities of the Planning Division are divided into four basic categories: (1) administration, under which the type and utilization of personnel is discussed along with their continuing education experiences; (2) planning data, which include additions to the Water Resources Information Center Library, the availability and use of computer programs to collect and use data on hydrologic parameters, water quality, and low flow for example, and the status of the U.S. Geological Survey cooperative data collection program; (3) planning liaison, particularly with federal studies and agencies such as the Corps of Engineers, the Soil Conservation Service, and the Environmental Protection Agency; and (4) the North Carolina Water Plan, for which Chapter 5 on intergovernmental relationships and Chapter 26 on the Broad River Basin were completed and several other chapters were nearing completion. Supporting data and information appears in appendices. (Elfers-North Carolina)
W74-01861

THE ADAPTED PUBLIC INVESTMENT MODEL WITH PARTICULAR REFERENCE TO THE WATER RESOURCE SECTOR IN METROPOLITAN DEVELOPMENT,
North Carolina Univ., Chapel Hill. Dept. of City and Regional Planning.
For primary bibliographic entry see Field 06C.
W74-01862

WATER QUALITY AND PUBLIC OPINION.
Gallup Poll, Princeton, N.J.

Journal of the American Water Works Association, Vol 65, No 8, p 513-519, August, 1973. 2 fig, 13 tab.

Descriptors: *Water quality, *Potable water, Water reuse, Water supply, Water pollution, *Attitudes.
Identifiers: *Public opinion, Polls.

A report of a survey conducted for the American Water Works Association discusses attitudes of consumers toward water supplies and pollution. Sixty-eight per cent of U.S. households obtain water from a government system, 20% from a well or spring, and 6% are serviced by a private water company. Seventy per cent of Americans are satisfied with the quality of their water, including taste, smell, and color. The most frequent complaint is that it 'tastes bad,' according to 14% of those surveyed. Southerners expressed the most satisfaction with their water, women and blacks the least. The facts that women are principal users of water and that many blacks live in substandard housing are offered as explanations of these findings. Only 10% of respondents said they were occasionally restricted in the amounts of water they could use. Meters are used in 83% of homes served by public sources, but only 73% of homes served by private sources. Satisfactory ratings for services of public and private water sources were comparable in propertion, although private sources received more ratings of 'excellent.' Most apprehensive about potential water shortages were persons with the most education, persons living in cities, and persons drawing water from public sources. A majority of users view pollution as a current threat to drinking water. Young adults are more included to view pollution as a threat to drinking water than adults over 50. Only 38% of respondents said they would not object to drinking recycled sewage. Tables present detailed analysis of the survey. (Stein-North Carolina)
W74-01867

SOUTHERN TIER EAST REGIONAL PLAN, BROOME-TIOGA COUNTIES, PRIORITIES FOR THE RIVERBANKS PLAN.
Egner and Niederkorn Associates, Inc., Ithaca, N.Y.

Available from the National Technical Information Service as PB-218 680 $6.00 in paper copy, $1.45 in microfiche. Prepared for Southern Tier East Regional Planning Agency, Binghamton, N.Y. Report EGNIED-72-09. September 1972. 79 p, 5 maps. HUD Project NYP-246.

Descriptors: *Recreation, *Parks, *Evaluation, Costs, Natural resources, *Regional analysis, Recreation facilities, *New York.
Identifiers: *Riverbanks, Water-related recreation, Susquehanna River, Broome-Tioga Counties (N.Y.), Criteria, Open Space.

This report, a supplement to the Riverbanks Plan formulated in the overall recreation study, is intended to implement the Riverbanks Plan by developing a more detailed and realistic set of criteria to evaluate and assign priorities to the elements of the Plan. The criteria are divided into two basic categories: desirability criteria and advisability criteria. The latter criteria are intended to add a dimension of political and economic reality to the overall ranking of the individual projects and parks. The desirability criteria include the quality of the natural features, the accessibility to population centers, the historical and archaeological value, and the susceptibility of the site to flooding. The advisability criteria include the possibility of preemption of the site for some other use, the poossibility that the site will be developed privately for recreation, acquisition costs involved, development costs for proposed use of the site, operation and maintenance costs, and the likely contribution of the potential park to the benefit of the people of the two-county region. Fifty-nine potential sites are evaluated using these criteria and the results are presented. (See also W74-01872) (Elfers - North Carolina)
W74-01871

SOUTHERN TIER EAST REGIONAL PLAN, BROOME-TIOGA COUNTIES, RECREATION, OPEN SPACES, RIVERBANKS.
Egner and Niederkorn Associates, Inc., Ithaca, N.Y.

Available from the National Technical Information Service as PB-217 296 $11.00 in paper copy, $1.45 in microfiche. Prepared for Southern Tier East Regional Planning Agency, Binghamton, N.Y. February, 1972. 154 p, 30 fig, 8 tab, 14 maps. Report EGNIGD-72-02. NYP-246 HUD Project.

Descriptors: *Recreation, *Parks, *On-site investigations, Planning, Recreation facilities, Surveys, Maps, *Regional analysis, *New York.
Identifiers: *Open space, *Riverbanks, Susquehanna River, Broome-Tioga Counties (N.Y.), Water-related recreation.

This report on outdoor recreation is divided into two studies: one on recreation facilities and the use of available open spaces in the two county region and the other on the specific development of the extensive riverbanks of the region for recreation. The emphasis is on developing a regional recreation system, preserving open space and natural resources, and greater use of the riverbanks of the Susquehanna, Chenango, and Tioughnioga Rivers. In both studies extensive use is made of U.S. Geological Survey maps, photographs, field surveys, and on-site inspections. Twenty-four regional park sites are analyzed and given a priority for development. Three criteria used in analysis are the availability of water resources and proper physiographic features, the minimal displacement of existing development and disruption of natural processes, and accessibility from existing roads. The riverbanks plan emphasizes the use of major park or open areas connected by open space strips along the rivers. Six types of open areas are identified as possible elements of the plan: (1) conservation areas to preserve natural features and processes; (2) basic park for light recreational activity; (3) intermediate park for picnicking and games; (4) intensive use park with the construction of public facilities; (5) special facilities; and (6) strip connections largely for hiking and connecting parks. Detailed plans including cost estimates are given for selected sites which illustrate the six types. (See also W74-01871) (Elfers - North Carolina)
W74-01872

ENVIRONMENTAL POLLUTION, A SURVEY EMPHASIZING PHYSICAL AND CHEMICAL PRINCIPLES,
Iowa State Univ., Ames. Dept. of Physics.
For primary bibliographic entry see Field 05B.
W74-02002

SOCIAL GOALS AND EVALUATION OF RESOURCE COMMITMENTS,
George Washington Univ., Washington, D.C. Dept. of Public Administration.
D. D. Bracken.
Water Resources Bulletin, Vol 9, No 3, p 485-493, June 1973. 15 ref.

Descriptors: *Social values, Evaluation, *Project planning, *Social impact, Social needs, *Water resources development, *Alternative planning.
Identifiers: Water Resources Council.

The field of water resources has become increasingly aware of public demands for evaluating alternative project commitments that consider environmental and social objectives in addition to traditional economic criteria. This has led to endeavors to identify the full array of social goals in Water Resources Council Special Task Force reports as well as in research funded through the Office of Water Resources Research and other agencies. It seems appropriate, however, to consider efforts already completed or currently underway in the social science disciplines, professional fields, and national commissions not affiliated with water resource interests. This report identifies and discusses major efforts to identify social goals as input in evaluation procedures highlighted by Water Resources Council Special Task Force reports.
W74-02110

COMPONENTS OF OUTDOOR RECREATIONAL VALUES: KISSIMMEE RIVER BASIN, FLORIDA,
Florida Univ., Gainesville. Water Resources Research Center.
K. C. Gibbs, and J. R. Conner.
Southern Journal of Agricultural Economics, p 239-244, July 1973. OWRR B-007-FLA (6). 14-31-0001-3267.

Descriptors: *Water allocation (Policy), *Water values, Water utilization, *Water demand, Decision making, *Florida, *Recreation demand.
Identifiers: *Kissimmee River basin (Fla).

Procedures are presented to estimate total recreational value of water in a river basin system: the Kissimmee River Basin, Florida. Two types of recreationists utilize the Kissimmee River Basin Waters. There are recreationists actually living (either permanently or during vacations and holidays) on lakefront property, as opposed to those traveling to the area primarily to partake in recreational activities through facilities providing public access to the water. For both types of recreationists the primary water-based activities include fishing, waterskiing, boating, and swimming. Visiting recreationists also enjoy camping. Procedures used in this study include interviews with both types of recreationists in order to obtain estimates of the annual value of recreation. To obtain as much homogeneity as possible, the year was divided into the following four time periods, determined partly by the types of recreation existing in each period: (1) February - May, (2) June - September, (3) October - November, and (4) December - January. (Morgan-Florida)
W74-02113

VACATION HOME LOCATION: A MODEL FOR SIMULATING THE RESIDENTIAL DEVELOPMENT OF RURAL RECREATION AREAS,
North Carolina Univ., Chapel Hill. Center for Urban and Regional Studies.
R. J. Burby, III, T. G. Donnelly, and S. F. Weiss.
Regional Studies, Vol 6, p 421-439, 1972. 2 fig, 9 tab, 13 ref, append. OWRR B-012-NC (11). 14-01-0001-1935.

Descriptors: *Urbanization, *Community development, *Recreation, *Land Development, Reservoirs, Impoundments, Land Use, Model studies, Computer models, North Carolina, Georgia.
Identifiers: *Vacation homes, Lake Norman (NC), Lake Sidney Lanier (Geo).

Vacation home communities are becoming increasingly common on the periphery of large metropolitan areas. While these developments pose a number of serious environmental and service problems for affected local governments, existing planning methodologies have ignored the spatial structure of vacation housing. Analysis of the vacation home development process highlights factors leading to environmental deterioration and indicates the extent to which urban and vacation home location decisions are based on different lo-

cational criteria. Utilizing this information and data describing the Lake Norman, North Carolina, and Lake Sidney Lanier, Georgia, reservoir areas, a computer model for simulating urban and vacation home development patterns is presented and evaluated. The model provides planners and policy makers with a useful tool to evaluate the effects of policy alternatives on recreation area development patterns and forecast the probable location of residential growth.
W74-02115

REGIONAL LAND USE PLAN, 1973, FOR HANCOCK, HARRISON, PEARL RIVER, JACKSON COUNTIES, MISSISSIPPI.
Gulf Regional Planning Commission, Gulfport, Miss.
For primary bibliographic entry see Field 04A.
W74-02120

WATER IN MISSISSIPPI,
Geological Survey, Jackson, Miss. Water Resources Div.
For primary bibliographic entry see Field 04A.
W74-02122

COMPREHENSIVE SEWERAGE PLAN FOR GRAND ISLAND, NEBRASKA.
Black and Veatch, Kansas City, Mo.
For primary bibliographic entry see Field 05D.
W74-02123

FLOOD PROTECTION FOR MISSOURI BOTTOMS.
Horner and Shifrin, Inc., St. Louis, Mo.
For primary bibliographic entry see Field 04A.
W74-02128

6C. Cost Allocation, Cost Sharing, Pricing/Repayment

SURVEY OF THE SOUTH CAROLINA OYSTER FISHERY,
South Carolina Wildlife and Marine Resources Dept., Charleston. Marine Resources Center.
R. C. Gracy, and W. J. Keith.
Technical Report No. 3, March 1972. 28 p, 17 fig, 4 tab, 63 ref.

Descriptors: *South Carolina, *Shellfish farming, Commercial shellfish, Oysters, Fish management, Regulation, Intertidal areas, Labor, Leases, Recreation.
Identifiers: Inefficiency, Labor shortages, Industry instability, Industry productivity.

Through an examination of the history of the current oyster industry this study reveals a declining trend in production since 1908 resulting from poor management, lack of suitable hand labor, and periodic labor shortages. Together these factors render instability, and low productivity. Poaching on private grounds is encouraged by the lack of commercial public grounds, and the absence of a licensing system which would restrict a harvester to a specific lease. A field survey of the oyster industry indicated that only one plant in South Carolina processes oysters, although the oyster supply is potentially very great. Leasing is complicated and requires inventories of intertidal areas which are often difficult to compile, however accurate records of leases, lessees, acreages and locations are nearing completion. Public oyster recreation areas are being reorganized. A 1970 feasibility study of intertidal management utilizing aerial photography indicated the method may be useful. Recommendations call for both immediate and future actions to ensure a revitalization of the industry before its decline becomes irreversible. (Weaver-Wisconsin)
W74-01830

SOME BIOLOGICAL CHARACTERISTICS OF A CHANNEL CATFISH POPULATION IN THE LOWER DES MOINES RIVER WITH AN EVALUATION OF POTENTIAL COMMERCIAL HARVEST,
Iowa State Conservation Commission, Des Moines. Fisheries Section.
J. Mayhew.
Available from NTIS as COM-72-10808 $3.00 in paper copy, $1.45 in microfiche. Iowa Fisheries Research Technical Series No 72-2, 1972. 52 p, 9 fig, 20 tab, 3 plates, 30 ref.

Descriptors: *Fish harvest, *Evaluation, *Fisheries, *Value, *Channel catfish, *Iowa, Commercial fish, Sport fish, Fisheries, Nets, Life history studies, Standing crops, Permits, Pollutants, Public health.
Identifiers: *Des Moines River (Iowa).

The impact of commercial fishing on the biological characteristics of the channel catfish population of the lower Des Moines River in Iowa was studies in order to determine their potential for commercial exploitation. Baited hoop net and slat trap techniques were employed for 4615 net days and single-wing fyke nets were fished 542 net days yielding a total catch of 43,272 channel catfish with a combined weight of 17,845 lbs. Numerical composition of catfish in the catch ranged from 53.9% to 88%. Estimated population density was 101,774 fish in 1966, and 107,240 in 1969. Net exploitation removed nearly 20% of the numerical population in 1967. Growth of channel catfish was slow requiring nearly 3.8 years for fish to reach 10 inches TL. Length-frequency, length:weight ratio, growth and body condition showed no perceptible change after exploitation. Regression analysis isolated spawning activity as the most important factor influencing catch. Potential harvest was estimated to range from 296 to 998 lbs. per mile when the minimum size limit was 10 inches TL, however given current prices this would be insufficient to support a profitable commercial fishery. Extension of sport fishery to include entrapment types of gear is recommended. (Weaver-Wisconsin)
W74-01833

THE DEVELOPMENT OF COMMERCIAL FOOD FISH POPULATIONS AT RED ROCK RESERVOIR DURING THE FIRST 3-YEARS OF IMPOUNDMENT,
Iowa State Conservation Commission, Des Moines. Fisheries Section.
J. Mayhew.
Available from NTIS as COM-73-10129 $3.00 in paper copy, $1.45 in microfiche. Iowa Fisheries Research Technical Series No 72-4, 1972. 56 p, 11 fig, 22 tab, 2 plates, 15 ref.

Descriptors: *Reservoir fisheries, *Commercial fish, *Baseline studies, *Market value, Fisheries, Reservoirs, Fish populations, Carp, Channel catfish, Buffalo fish, Carpsucker, Fish harvest, Fishing gear, Nets, Baits, Fish management, *Iowa.
Identifiers: *Lake Red Rock (Iowa), Des Moines River (Iowa), Gizzard shad.

Commercial food fish populations were studied during the first three years of the impoundment of the Lake Red Rock reservoir in Iowa. Measurement of changes in the food fish populations as the reservoir filled and as the populations were exploited by an experimental net fishery was the principal objective of the study. Fish species of main interest included carp, river carpsucker, buffalo and channel catfish. The fishery registered a total catch of 321,937 food fish weighing 151,533 lbs., dominated by carp in the first two years, and river carpsucker during the third. Commercial food fish comprised 80% of the fishery by number. Fishing gear included frame nets, gill nets, baited hoop nets and slat traps which yielded highest catch success (except for gill nets) in the second year. Early life history studies of gizzard shad and carp showed the former to be nearly equally distributed throughout the reservoir, and the latter to be more dense in the upper portion of the reservoir and in shallow embankments. Initial increase of impoundment elevation resulted in accelerated fish growth. The fishery showed no measurable effects on growth or body condition. Discussion of biological characteristics of the commercial food fish and recommendations for utilizing surplus stocks are presented. (Weaver-Wisconsin)
W74-01834

SALMON ROE BECOMES IMPORTANT FISHERIES PRODUCT,
J. Wiese.
Alaska Industry, p 14 and 57, December 1972.

Descriptors: *Marketing, *Fish eggs, *Salmon, Fish harvest, Canneries, Market value, Fisheries, Commercial fishing.
Identifiers: *Salmon roe, Offal utilization.

Just as halibut livers came into unexpected high demand forty years ago as a source of newly discovered vitamins, so salmon roe, the unspawned eggs of the female, are in accelerated demand by the affluent Japanese consumer. Substantial supply of salmon roe to the Japanese market began in 1964 when salmon roe utilization rose from between 100,000 and 600,000 to nearly 2.4 million pounds with a value of over $1.1 million. This demand growth has continued and in 1970 a bumper salmon harvest yielded 9.7 million pounds. Total product yield exceeded 47.4 million pounds in the decade between 1962 and 1971, inclusive, and had a value of nearly $49.9 million. This trend of profitable offal utilization has led to experimental use of male salmon milt sacs by pharmaceutical manufacturers, and cut-away portions of fish for industrial fishing bait and pet food manufacturing. (Weaver-Wisconsin)
W74-01836

EXTENDED RESULTS ON OPTIMAL INVESTMENT STRATEGIES IN SHRIMP FISHING,
Texas A and M Univ., College Station. Inst. of Statistics.
R. L. Sielken, Jr., R. G. Thompson, and R. R. Wilson.
Report TAMU-SG-211, December 1972. 27 p, 8 tab, 3 ref. NOAP 2-35213.

Descriptors: *Commercial fishing, *Investment, *Shrimp, Mathematical models, Boats.
Identifiers: *Optimal investment strategies, Integer programming, Commercial shrimp fishing.

This study is an extension to a deterministic model developed including alternative size boats in the investment opportunity set. Maximization, an objective of the firm's net worth, is constrained by three difference equations limiting the fisherman to positive investment in integer number of boats and restricting the amount of the borrowing and repayment schedule. Three numerical examples are presented for three different sets of parameter values and initial state values which reflect existing conditions of operation in the Gulf of Mexico during 1969. The mathematical programming problem associated with each of the three illustrative cases are solved and compared with sub-optimal conservative investment strategies of purchasing no additional fishing capacity and retaining all cash flows net of debt repayment as savings. Computer costs for implementing the model for the typical fishing firm are estimated at $25 per year. (Weaver-Wisconsin)
W74-01838

OPTIMAL CAPITAL ACCUMULATION IN A POLLUTED ENVIRONMENT,
Australian National Univ., Canberra.
For primary bibliographic entry see Field 05G.
W74-01840

THE STEEL INDUSTRY AND ENVIRONMENTAL QUALITY.
National Industrial Pollution Control Council, Washington, D.C. Steel Sub-Council.
For primary bibliographic entry see Field 05G.
W74-01841

THE ADAPTED PUBLIC INVESTMENT MODEL WITH PARTICULAR REFERENCE TO THE WATER RESOURCE SECTOR IN METROPOLITAN DEVELOPMENT,
North Carolina Univ., Chapel Hill. Dept. of City and Regional Planning.
K. Elfers.
In: The Metropolitan Planning Process: An Exploratory Study, Appendix I-2, p 35-165. August 15, 1970. 1 tab, 1 append. N.C. Project PD-3. HUD Support under 701 (b).

Descriptors: *Planning, *Water resources, *Methodology, Cities.
Identifiers: *Metropolitan planning process, *Public investment model, Metropolitan development, Plan formulation, Review of consequences.

The ways in which planning for individual sectors, e.g. water resources, on a metropolitan basis influences, and is influenced by, planning for other sectors, and the problems and issues of 'comprehensive' planning over all sectors on the metropolitan scale are explored. Fundamental objectives identified for water resources planning and development are economic efficiency, income redistribution, and environmental quality. Conflicts between these are likely although planning may contribute to all three. The commonality of these objectives with those of other metropolitan sectors suggests the importance of interrelationships. Specific objectives are established in relation to particular needs or issues indicating courses of action. Specific objectives should by clearly related to the metropolitan framework of fundamental objectives. Criteria in the water resource sector include guidelines indicating planning directions, constraints on what is feasible, and rules for choice among alternatives. Perhaps the most important inter-sectoral aspect of criteria is that of consistency and compatibility. The objective of plan formulation in the water resource sector is to maximize an objective function subject to various constraints. It does not follow that a combination of similarly produced optimal sectoral plans will produce an optimal metropolitan plan because of linkages among sectors which must be identified. Review of consequences for the water resource sector will be concerned with the capacity of the planning process to cope with the unique needs of the metropolitan area. Review of consequences for other sectors will be important. (Edwards-North Carolina)
W74-01862

COMPUTER SYSTEM FOR THE DESCRIPTION AND EVALUATION OF COMMUNITY WATER SYSTEMS BASED ON REVERSE OSMOSIS DESALINATION,
Digital Systems Corp., Hanover, N.H.
For primary bibliographic entry see Field 03A.
W74-01938

ECONOMIC GUIDELINES FOR PUBLIC UTILITIES PLANNING,
Duke Univ., Durham, N.C. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05D.
W74-02114

6D. Water Demand

BOISE METROPOLITAN AREA SANITARY SEWAGE COLLECTION AND TREATMENT FACILITIES: PHASE II REPORT.
J-U-B Engineers, Inc., Boise, Idaho; and Barton, Stoddard, Milhollin and Higgins, Boise, Idaho.
For primary bibliographic entry see Field 05D.
W74-01854

A COMPREHENSIVE PLAN FOR THE FOX RIVER WATERSHED: VOLUME ONE: INVENTORY FINDINGS AND FORECASTS.
Southeastern Wisconsin Regional Planning Commission, Waukesha.
For primary bibliographic entry see Field 04D.
W74-01856

USE AND CONSERVATION OF WATER RESOURCES IN LITHUANIA (ISPOL'ZOVANIYE I OKHRANA VODNYKH RESURSOV LITOVSKOY SSR),
For primary bibliographic entry see Field 04B.
W74-01970

USE AND CONSERVATION OF WATER RESOURCES IN THE UKRAINE (ISPOL'ZOVANIYE I OKHRANA VODNYKH RESURSOV V UKRAINSKOY SSR),
For primary bibliographic entry see Field 05D.
W74-01971

WATER DEMAND OF SINGLE DWELLING RESIDENCES (DEMANDE EN EAU DE RESIDENCES UNIFAMILIALES),
D. Mascolo, and H. Demard.
INRS-Eau, Technical Report No 11, 1973. 88 p.

Descriptors: *Water supply, *Water distribution (Applied), *Water demand, *Distribution Systems, Cost-benefit analysis, Flowmeters, Data collections, *Canada.
Identifiers: *Residential water use, Residence time distribution, Peak demand, Remote reading, Meter reading.

Within the outline of a research program on water distribution system management the demand function of single dwelling units has been considered. The variations of the demand of nine single dwelling units (located in Sherbrooke, Quebec, Canada) has been studied on a 1 minute to 1 week time basis. The approach allowed the analysis of demand structure and a statistical definition of peaks intensity. The superposition of the demand of several residences has also been considered in a statistical way. (Cantin-INRS-Eau)
W74-02045

LOWER SAN JOAQUIN RIVER WATER QUALITY INVESTIGATION--APPENDIX F: PUBLIC HEARING,
California State Dept. of Water Resources, Sacramento.
D. J. Smith.
Available from State of Calif, Dept. of Water Resources, P.O. Box 388 Sacramento, Calif 95802. Bulletin No 143-5, June 1970. 9 p, 1 tab.

Descriptors: *Water quality, *Rivers, *California, Investigations, Conferences, Reviews, Evaluation, Water quality control, Water management (Applied), Water law, Water rights, State governments, Water demand, Water supply, Water utilization.
Identifiers: *Lower San Joaquin River (Calif), Public hearing.

On January 15, 1970, a public hearing on Bulletin No. 143-5, 'Lower San Joaquin River Water Quality Investigation', was conducted jointly in Modesto by the State Water Resources Control Board, represented by Kenneth L. Woodward, Chief, Water Rights Division; the California Regional Water Quality Control Board, Central Valley, represented by Robert L. Wall, Board Member; and the California Department of Water Resources, represented by Carl L.Stetson, District Engineer, San Joaquin District. A summary of written comments received before, during, and after the hearing and oral comments received at the hearing is presented. (Woodard-USGS)
W74-02142

6E. Water Law and Institutions

ARID URBAN WATER MANAGEMENT: SOME ECONOMIC, INSTITUTIONAL AND PHYSICAL ASPECTS,
Nevada Univ., Reno. Desert Research Inst.; and Nevada Univ., Reno. Center for Water Resources Research.
For primary bibliographic entry see Field 06B.
W74-01662

HAWAII'S SYSTEM OF WATER RIGHTS: AN ECONOMIC EVALUATION,
Hawaii Univ., Honolulu. Water Resources Research Center.
E. T. Morahan, and H. Yamauchi.
Available from the National Technical Information Service as PB-225 543/6, $3.00 in paper copy, $1.45 in microfiche. Technical Report No. 57, August 1972. 33 p, 5 ref. OWRR A-019-HI (2) 14-31-0001-3211.

Descriptors: *Water rights, *Water law, *Hawaii, Water allocation (Policy), Surface waters, Groundwater, Water resources development, Riparian rights, Institutional constraints, Land tenure, Investment.
Identifiers: *Property rights, Correlative rights.

The economic values of Hawaii's water resources associated with its unique traditional system of water rights and the correlative rights doctrine of the western world are described. The traditional Hawaiian system is intimately related to the land title system which was based on a common property concept. Water rights were often allocated according to the percentage of total labor contributed to the water resources development. Acquisition of water rights are limited to public or private grant, prescription or condemnation of previous rights. An exception exists in the case of artesian ground water for which rights are associated with owners of the overlying land by a correlative rights doctrine. Analysis indicates that the traditional system not only adequately defines water rights, but also ensures greater investment security than the correlative rights doctrine with its inherent tenure uncertainty. In addition, the traditional system allows greater flexibility for surface water reallocation without threatening investment security as offered by the correlative rights doctrine. (Weaver-Wisconsin)
W74-01785

ROLE OF THE FEDERAL GOVERNMENT IN CONTROLLING NUTRIENTS IN NATURAL WATERS,
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
For primary bibliographic entry see Field 05C.
W74-01808

DEVELOPMENT OF NUTRIENT CONTROL POLICIES IN CANADA,
Department of Energy, Mines and Resources, Ottawa (Ontario). Inland Waters Branch.
For primary bibliographic entry see Field 05C.
W74-01809

REGULATING FLOOD-PLAIN DEVELOPMENT,
Chicago Univ., Ill. Dept. of Geography.
For primary bibliographic entry see Field 06F.
W74-01851

WATER POLLUTION, ENVIRONMENTAL ENHANCEMENT STUDY, (4).
Lehigh-Northampton Counties Joint Planning Commission, Lehigh Valley, Pa.
For primary bibliographic entry see Field 05G.
W74-01852

THE NATIONAL WATER COMMISSION REPORT: A REVIEW,
Arizona Univ., Tuscon. Inst. of Government Research.
H. Ingram, T. G. Roefs, and D. J. Allee.
Institute Series No. 14, May 1973. 26 p, 12 ref.

Descriptors: *Reviews, *National Water Commission, Political aspects, Analysis, *Evaluation, Social values, Water values, *Appraisals, *Assessments, Social impact, Economic impact.

The ideas, assumptions, and framework of the draft of the National Water Commission report and the Commission's work are discussed. Lacking a defined decision space, the Commission seems to have taken the view that its charge was to address a range of issues about which controversies had occurred and to be idealistic about how arrangements to resolve these controversies might be made. Implicit in the report, though, are values that guided the Commission. These include rationality, efficiency, equity, faith in dollar measurements, support of new federalism, and advocacy of policy separate from administration. The implications of a non framework on the contents of the report are drawn. The report is characterized by a problem-by-problem focus and a disconnected set of 'should' statements. The report never specifies an effect space. Four major criticisms of the recommendations made in the report are: they are not consistent; they are not cross-referenced; they vary greatly in specificity, from the very general to the detailed; and they assume the existence of analytic and organizational resources which have not been shown to exist. A prognosis is made about the impact of the report. (Hoffman-North Carolina)
W74-01853

NORTH CAROLINA WATER PLAN-PROGRESS REPORT: CHAPTER 44, THE APPALACHIAN REGION IN NORTH CAROLINA.
North Carolina State Dept. of Water and Air Resources, Raleigh.
For primary bibliographic entry see Field 06B.
W74-01859

NORTH CAROLINA WATER PLAN-PROGRESS REPORT CHAPTER 25, THE CONCEPT OF BASIN AND REGION REPORTS IN THE NORTH CAROLINA WATER PLAN.
North Carolina State Dept. of Water and Air Resources, Raleigh.
For primary bibliographic entry see Field 06B.
W74-01860

NORTH CAROLINA WATER PLAN PROGRESS DURING F.Y. 1973.
North Carolina Dept. of Natural and Economic Resources, Raleigh. Office of Water and Air Resources.
For primary bibliographic entry see Field 06B.
W74-01861

WATER QUALITY AND HUMAN HEALTH,
Ministry of Health, New Delhi (India).
For primary bibliographic entry see Field 05F.
W74-01865

INTERNATIONAL WATER QUALITY LAW,
New Mexico Univ., Albuquerque. School of Law.
For primary bibliographic entry see Field 05G.
W74-01869

SUMMARIES OF FOREIGN GOVERNMENT ENVIRONMENTAL REPORTS.
Environmental Protection Agency, Washington, D.C. Library Systems Branch.
For primary bibliographic entry see Field 05G.
W74-01886

INTERNATIONAL SYMPOSIUM ON HYDROLOGY OF WATERLOGGED AREAS (MEZHDUNARODNYY SIMPOZIUM PO GIDROLOGII ZABOLOCHENNYKH TERRITORIY),
For primary bibliographic entry see Field 02G.
W74-01963

SCIENTIFIC PRINCIPLES OF WATER LEGISLATION (NAUCHNYYE OSNOVY VODNOGO ZAKONODATEL'STVA),
V. I. Korzun.
Vodnyye Resursy, No 3, p 33-34, 1972.

Descriptors: *Water law, *Legislation, *Regulation, *Water utilization, *Water conservation, Water pollution control, Legal aspects, Jurisdiction, Water permits, Water rights, Planning.
Identifiers: *USSR.

The goals of the 'Principles of Water Law of the USSR and Union Republics,' adopted by the USSR Supreme Soviet on December 10, 1970, are the regulation of water relations to (1) ensure the rational use of water for the needs of the population and the national economy; (2) protect water from pollution, obstruction, and depletion; (3) prevent and eliminate the harmful action of water; (4) improve the condition of water bodies; (5) protect the rights of enterprises, organizations, institutions, and citizens; and (6) strengthen the law in the field of water relations. All waters of the USSR constitute a common state resource, which includes (1) rivers, lakes, reservoirs, other surface waters and water sources, as well as waters of canals and ponds; (2) subsurface waters and glaciers; (3) inland seas and other inland seawaters of the USSR; and (4) territorial waters of the USSR. The jurisdiction of the USSR and Union Republics in the field of regulation of water relations is defined together with the forms of water use, procedures and conditions for granting the use of water bodies, time periods of water use, and the rights and obligations of water users. To ensure the rational use and conservation of water and its protection from obstruction and depletion, a state water survey is maintained, current and long-range state water resources balances are compiled, and schemes are developed for the integrated utilization and conservation of water. The state water survey includes record-keeping data on water quantity and quality, registration of water users and water use, and record-keeping data on the utilization of water. (Josefson-USGS)
W74-01968

WATER POLLUTION CONTROL ACROSS THE NATION,
For primary bibliographic entry see Field 05G.
W74-01975

6F. Nonstructural Alternatives

WATER MANAGEMENT.
Orange-Seminole-Osceola Planning Commission, Orlando, Fla.

Technical Report. February, 1970. 73 p, 3 maps. HUD Project Fla-P-92.

Descriptors: *Flood protection, *Drainage systems, *Lakes, *Groundwater, *Florida, Flood control, Flood plain zoning, Swamps, Aquifers.
Identifiers: Orange County (Fla), Flood control districts, Seminole County (Fla), Osceola County (Fla).

Although flood protection receives the most attention in this study of water management in the Orlando metropolitan area, water quality and aquifer recharge are also examined. The 'people-water principle,' governs flood-protection policy, i.e. 'in existing urbanized areas, keep the water from interfering with the people, but in all other areas, keep the people from interfering with the water.' In borderline area between developed and undeveloped land, the choice of whether to drain land or buy it for flood plain should be decided on the basis of minimizing public expense. Recognizing the natural ability of swamps to accommodate floodwaters, swamp preservation is urged in preference to indiscriminate drainage and urbanization. Zoning, subdivision controls, and building codes should be used to restrict development in flood-prone areas whenever feasible. Reanalysis is asked for many drainage projects proposed by the Orange County Water Board and Central and Southern Florida Flood Control District. To preserve the quality of groundwater, urbanization should be limited in western Orange and Seminole Counties, primary aquifer recharge areas. To protect water quality, it is urged that lake levels be allowed to fluctuate naturally whenever feasible, that treated effluent be sprayed over land or into swamps instead of lakes and streams, and that septic tanks be disallowed in urban areas. Maps illustrate flood-prone areas, waters of known qualities, and aquifer recharge areas. Thirty-four watersheds are analyzed individually. Soil limitations for development, natural flood storage areas and urbanization trends are noted, existing water control plans are analyzed, and recommendations are made. (Stein-North Carolina)
W74-01850

REGULATING FLOOD-PLAIN DEVELOPMENT,
Chicago Univ., Ill. Dept. of Geography.
F. C. Murphy.
Research Paper No. 56 University of Chicago Press, Chicago, Ill. 1957. 204 p. 23Water resources, *Land use, *Planning, *Flood protection, *Flood plains, *Flood control, Environmental effects, Flood plain zoning, Flood plain insurance, Flood data, Flooding, Building codes, Political aspects, Legal aspects, Damages, Urbanization, Flood forecasting.
Identifiers: *Flood plain regulation, Channel encroachment, Subdivision regulation, Urban development.

This study, undertaken to ascertain what is necessary and practicable in the regulation of flood-plain development to reduce flood losses, sought to appraise current methods of regulating development in flood areas and to formulate a feasible, more realistic and nation-wide program for action in flood-plain regulation. Attention was directed toward areas subject to fresh-water flooding. Findings included the following: channel-encroachment laws, flood-plain zoning provisions, subdivision regulations, building codes and other methods of flood-plain regulation did not, as applied at the time, halt the continued increase of flood losses. State laws preventing channel encroachment were in force in only seven states. Flood-plain zoning provisions, usually attempted to restrict development in only the undeveloped portion of the flood plain, and designated little or none of the area which had already been flooded or only areas subject to frequent flooding. Criteria in subdivision regulations used to restrict flood-plain development usually covered only that area inundated by floods in the 15 to 35 year frequency range. Practically no instances of the use of building codes to regulate development in flood prone

areas could be found. Permanent evacuation of communities has had only limited success. Government acquisition of flood plain land has been more successful. Financial organizations make little or no effort to guide development in flood areas. The role of flood insurance is discussed. A series of government actions at federal, state and local levels are recommended to reduce flood losses. (Edwards-North Carolina)
W74-01851

A COMPREHENSIVE PLAN FOR THE FOX RIVER WATERSHED: VOLUME TWO: ALTERNATIVE PLANS AND RECOMMENDED PLAN.
Southeastern Wisconsin Regional Planning Commission, Waukesha.
For primary bibliographic entry see Field 04D.
W74-01857

FLOOD PLAIN INFORMATION, RABBIT CREEK, ANCHORAGE, ALASKA.
Army Engineer District, Anchorage, Alaska.

Prepared for the Greater Anchorage Area Borough, May 1973. 27 p, 12 fig, 29 plate, 2 tab.

Descriptors: *Floods, *Flood plains, *Flood control, *Flood data, *Alaska, Hydrologic data, Flood profiles, Flood forecasting, Historic floods, Streamflow, Flow characteristics, Data collections, Photography.
Identifiers: *Anchorage (Alaska), *Rabbit Creek (Alaska), Intermediate regional flood, Standard project flood.

The portion of the Greater Anchorage Area Borough, Alaska, covered by this report is subject to flooding from Rabbit Creek. The properties along this stream are primarily residential and were moderately damaged by the flood of June 1964. The areas in the flood plain which are now under pressure for development are extensive. Although large floods have occurred in the past, studies indicate that even larger floods are possible. A knowledge of flood potential and flood hazards is important in land use planning and for management decisions concerning flood plain utilization. This history of flooding in the Rabbit Creek area identifies those areas that are subject to possible future floods. Special emphasis is given to these floods through maps, photographs, profiles, and cross sections. Solutions to flood problems are not provided; however, a suitable basis for the adoption of land-use controls is furnished to guide flood-plain development and thereby prevent intensification of loss and damage. (Woodward-USGS)
W74-01873

FLOOD PLAIN INFORMATION, PASCAGOULA-GAUTIER COASTAL AREAS, JACKSON COUNTY, MISSISSIPPI.
Army Engineer District, Mobile, Ala.
For primary bibliographic entry see Field 04A.
W74-02121

WATER AND THE LAND: OPPORTUNITIES AND PROBLEMS IN FORSYTH, NORTH CAROLINA.
City-County Planning Board, Winston-Salem, N.C.
For primary bibliographic entry see Field 04A.
W74-02129

6G. Ecologic Impact of Water Development

ENVIRONMENTAL SURVEY OF THE TETON RIVER AND HENRY'S FORK OF THE SNAKE RIVER,
Idaho Univ., Moscow. Water Resources Research Inst.
For primary bibliographic entry see Field 04A.
W74-01839

NATURAL CONCERN: AN ECOLOGICAL ANALYSIS OF BIBB COUNTY.
Macon-Bibb County Planning and Zoning Commission, Macon, Ga.

March, 1972. 39 p, photos, 80 ref. Price: $1.00.

Descriptors: *Urbanization, *Environmental effects, *Pollutants, Natural resources, Water resources, Soils, Wildlife, *Ecology, Planning, Atmosphere, *Georgia.
Identifiers: *Macon (Ga), Bibb County (Ga).

Urban growth in Bibb County, Georgia, like growth in most of the country, has moved forward without much consideration for the natural environment and relationships between urban activities and natural processes. The nature of several elements and processes in the environment is described to help build a better understanding of the natural environment and of how man can live more compatibly within it. The elements covered are the air, water resources, soils, plant life, and wildlife. Each element is discussed in terms of its physical characteristics, its importance to man and to the total environment, the causes and nature of pollution of or losses in the element, and the consequences for man when these adverse conditions occur. Sensory pollutants and radioactive pollution also are discussed. The relationship of these elements and the broader ecological systems to urban development is described especially with regard to the dynamic and renewable nature of most natural systems and resources. The use of ecologic principles and the identification of development constraints in planning urban growth and the implementation of conservation programs to protect natural resources are recommended. (Elfers-North Carolina)
W74-01848

OPEN SPACE: PRELIMINARY PLAN.
Los Angeles Dept. of City Planning, Calif.

City Plan Case No 24533. January, 1973. 19 p, photos, 1 map.

Descriptors: *Planning, *Natural resources, *Conservation, Recreation, Parks, Urbanization, Environmental effects, Ecology, Coordination, *California.
Identifiers: *Open space, Land use controls, Policies, *Los Angeles (Cal).

The plan is intended to be a guide for governmental agencies and interested citizens for the identification, preservation, and acquisition of open space in Los Angeles. The plan applies to both public and private open space and consists of five basic parts: a definition of goals and objectives, formulations of policies and of standards and criteria, and presentations of the plan itself and of the programs to implement it. The basic goals include the conservation of open space for recreation, for health and safety, and for urban form and identity, the preservation of vital environmental resources such as water and air, and the conservation of unique natural features and scenic areas. Numerous policies related to these goals are presented under four categories: general policies, policies for privately owned open space, policies for publicly owned open space, and policies for publicly owned open areas such as reservoirs, land-fill sites, and utility rights-of-way. Standards and criteria are developed to cover scenic drives, scenic corridors, density of development in open space zones, historical sites, the identification of open spaces, and the priority of open space types. The plan is essentially based on a map delineating existing and desirable open space lands. The desirable lands include ecologically important areas and a city-wide trail system. Programs to implement the policies and plan include further studies, legislation to control open areas, and specific proposals for both private and public open space management. (Elfers-North Carolina)
W74-01849

MISSISSIPPI/MINNEAPOLIS-A PLAN AND PROGRAM FOR RIVERFRONT DEVELOPMENT.
Riverfront Planning Team of Minneapolis Planning and Development, Minn.
For primary bibliographic entry see Field 03D.
W74-01855

A CONSERVATION ELEMENT FOR THE SACRAMENTO GENERAL PLAN.
Sacramento City Planning Commission, Calif.

Final draft. June 7, 1973. 25 p, 3 fig.

Descriptors: *Natural resources, *Conservation, *Water supply, Water quality, *Environmental effects, Groundwater, Planning, Water resources, Soils, Urbanization, Flood control, *California, Water conservation.
Identifiers: Land use controls, Goals, Policies, *Sacramento (Calif).

The purpose of the Conservation Element is to provide a framework for the conservation and development of natural resources within the City of Sacramento, California. Several basic goals and general policies for the total environment are identified. Land resources, water resources and biological resources are described in more detail. Primary water supply for municipal usage comes from the American River and the Sacramento River. Supplemental water is provided from Lake Folsom by contract purchase. Adequate surface supply for future growth appears to be available. Pollution from agricultural waste, increasing urbanization, and use of the rivers for recreation threatens to impair the present high water quality. Cetralization of waste water treatment facilities is planned. Some areas will require surface water drainage and flood controls. Water management policies recommended for adoption include: prohibit urban type use in all flood prone areas by use of zoning and special permit regulations; develop and improve water supply facilities; encourage participation of private and public groups in planning and development of water resources; meet standards set by the Regional Water Quality Control Board for both surface and ground water; encourage well users to utilize municipal water supply; continue cooperation with other agencies to reduce ground water extractions to a safe annual yeild. The report and its policies were adopted by the City Council on June 7, 1973. (Hufschmidt-North Carolina)
W74-01864

ECOLOGY OF SALT MARSHES AND SAND DUNES,
For primary bibliographic entry see Field 02L.
W74-01984

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE BEAVER VALLEY POWER STATION, UNIT 1.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 05C.
W74-02004

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE BEAVER VALLEY POWER STATION, UNIT 2.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 05C.
W74-02005

FINAL ENVIRONMENTAL STATEMENT RELATED TO OPERATION OF TROJAN NUCLEAR PLANT.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 05C.
W74-02006

ENVIRONMENTAL SCIENCE TECHNOLOGY INFORMATION RESOURCES,
S. B. Tuwiner.
Noyes Data Corporation: Park Ridge, N.J., London, England, 1973. 218 p. Illus. Pr. $18.00.
Identifiers: Books, *Environmental information resources, Science, Technology, *Information resources, *Technical information.

This book is the result of the rapidly increasing demand for methods by which environmental information may be obtained. The first section includes the proceedings and panel discussion of the Symposium on Environmental Science Technology Information Resources, including papers on the following specific topics: resources and industrial cooperation on environmental control at the American Petroleum Institute; Environmental Protection Agency (EPA) and its research and development program; government sources of information on environmental control; data vs information; environmental control resources of a large technical library. Section 2 contains selected papers presented at the National Environmental Information Symposium, including papers on the following specific topics: technical information programs in the EPA; federal environmental data centers and systems; scientific and technical information centers concerned with the biological sciences; scientific and technical primary publications carrying environmental information; secondary technical and scientific information journals; applications of socioeconomic information to environmental research and planning; and selected listing of information centers and services available in the socio-economic area. The final section contains a bibliography of basic governmental, institutional and organizational documents assembled by the United Nations Conference on the Human Environment, including references in the following areas: basic documents received from states invited to the conference: basic documents prepared within the United Nations system; basic documents received from other sources; draft position papers; and other papers. The 3 conferences covered above all occurred in 1972.--Copyright 1973, Biological Abstracts, Inc.
W74-02100

THE WET AND THE DRY: TRADITIONAL IRRIGATION IN BALI AND MOROCCO,
Institute for Advanced Study, Princeton, N.J.
C. Geertz.
Hum Ecol. Vol 1, No 1, p 23-39. 1972.
Identifiers: *Bali, Climates, Cultural factors, Ecological studies, *Irrigation, *Morocco.

The comparative perspective is of central importance to effective analysis in human ecology. 'Traditional' irrigation systems in 2 quite disparate settings are compared: east central Morocco and southeastern Bali. Bali, which has a topical climate and a plentiful water supply, displays a highly collective approach to the organization of irrigation facilities. Morocco, which is essentially an arid country, displays, on the contrary, a much more individual, property-based approach to water regulation. The internal organization of these 2 regimes is described, and their connection with more general cultural and ecological factors is traced, in an attempt to demonstrate that patterns of adaptation are susceptible to the same pattern of anlysis as other aspects of social and cultural life. The contrast between the strongly group-oriented Balinese approach to water control and distribution and the highly individualistic Moroccan one is said to extend in an overall way to the 2 societies as a whole.--Copyright 1973, Biological Abstracts, Inc.
W74-02106

07. RESOURCES DATA

7B. Data Acquisition

SYMPOSIUM ON SIGNIFICANT RESULTS OBTAINED FROM THE EARTH RESOURCES TECHNOLOGY SATELLITE-1, VOL I--TECHNICAL PRESENTATIONS.

Available from GPO, Washington, D C 20402. Price $13.65 per set (Sect A and B). National Aeronautics and Space Admin Rept NASA SP-327, 1730 p, 1973.

Descriptors: *Remote sensing, *Satellites (Artificial), *Mapping, *Surveys, *Monitoring, Land use, Geologic mapping, Terrain analysis, Water resources, Snow, Ice, Lakes, Glaciers, Management, Planning, Water resources development, Wildlife.
Identifiers: *ERTS.

The first Earth Resources Technology Satellite (ERTS-1) was launched on July 23, 1972. In the 7 months since it was activated, over 34,000 scenes of the earth have been obtained covering all major land masses and about 75% of the world's land area. Some areas, such as the United States, have been imaged at least 12 times. The purpose of this program is to provide an assessment of remote sensing from a satellite as a technique for inventorying and monitoring the earth's resources to provide better management of these resources. The quality of the products produced by the ERTS-1 system is, from a resolution and radiometric accuracy viewpoint, quite consistent with prelaunch estimates. In the geometric sense, these data products are somewhat better than prelaunch estimates. (See also W74-01163 and W74-01664 thru W74-01712) (Knapp-USGS)
W74-01663

ERTS-1 DATA PRODUCT PREFORMANCE,
General Electric Co., Philadelphia, Pa. Space Systems Div.
For primary bibliographic entry see Field 07C.
W74-01664

IDENTIFICATION OF WINTER WHEAT FROM ERTS-1 IMAGERY,
Kansas Univ./Center for Research, Inc., Lawrence.
For primary bibliographic entry see Field 03F.
W74-01665

SEMI-AUTOMATIC CROP INVENTORY FROM SEQUENTIAL ERTS-1 IMAGERY,
California Univ., Riverside. Dept. of Geography.
For primary bibliographic entry see Field 03F.
W74-01666

CROP IDENTIFICATION USING ERTS IMAGERY,
South Dakota State Univ., Brookings. Remote Sensing Inst.
For primary bibliographic entry see Field 03F.
W74-01667

IDENTIFICATION OF LARGE MASSES OF CITRUS FRUIT AND RICE FIELDS IN EASTERN SPAIN,
For primary bibliographic entry see Field 03F.
W74-01668

ENGINEERING ANALYSIS OF ERTS DATA FOR SOUTHEAST ASIAN AGRICULTURE,
General Electric Co., Philadelphia, Pa. Re-entry and Environmental Systems Div.
For primary bibliographic entry see Field 03F.
W74-01669

AN INTERREGIONAL ANALYSIS OF NATURAL VEGETATION ANALOGUES USING ERTS-1 IMAGERY,
Earth Satellite Corp., Berkeley, Calif.
For primary bibliographic entry see Field 03F.
W74-01670

NATURAL VEGETATION INVENTORY,
Oregon State Univ., Corvallis. Rangeland Resources Program.
For primary bibliographic entry see Field 04A.
W74-01671

VEGETATIVE AND GEOLOGIC MAPPING OF THE WESTERN SEWARD PENINSULA, ALASKA, BASED ON ERTIS-1 IMAGERY,
Alaska Univ., College.
For primary bibliographic entry see Field 04A.
W74-01672

ERTS-1 EVALUATION OF NATURAL RESOURCES MANAGEMENT APPLICATIONS IN THE GREAT BASIN,
Nevada Univ., Reno. Remote Sensing Lab.
For primary bibliographic entry see Field 04A.
W74-01673

EVALUATION OF ERTS-1 IMAGERY IN MAPPING AND MANAGING SOIL AND RANGE RESOURCES IN THE SAND HILLS REGION OF NEBRASKA,
Nebraska Univ., Lincoln. Dept. of Agronomy.
For primary bibliographic entry see Field 04A.
W74-01674

MONITORING CALIFORNIA'S FORAGE RESOURCE USING ERTS-1 AND SUPPORTING AIRCRAFT DATA,
California Univ., Berkeley. Forestry Remote Sensing Lab.
For primary bibliographic entry see Field 04A.
W74-01675

TESTING THE USEFULNESS OF ERTS-1 IMAGERY FOR INVENTORYING WILDLAND RESOURCES IN NORTHERN CALIFORNIA,
California Univ., Berkeley. Forestry Remote Sensing Lab.
For primary bibliographic entry see Field 04A.
W74-01676

INTERPRETATION OF ERTS-MSS IMAGES OF A SAVANNA AREA IN EASTERN COLOMBIA.
Centro Interamericano de Fotointerpretacion, Bogota (Colombia).
For primary bibliographic entry see Field 02G.
W74-01677

DELINEATION OF MAJOR SOIL ASSOCIATIONS USING ERTS-1 IMAGERY,
Tennessee Univ., Knoxville. Dept. of Soil Science.
For primary bibliographic entry see Field 02G.
W74-01678

EVALUATION OF REMOTE SENSING IN CONTROL OF PINK BOLLWORM IN COTTON,
California Univ., Riverside. Citrus Research Center and Agricultural Experiment Station.
For primary bibliographic entry see Field 03F.
W74-01679

APPLICATION OF ERTS-1 IMAGERY AND UNDERFLIGHT PHOTOGRAPHY IN THE DETEC-

TION AND MONITORING OF FOREST INSECT INFESTATIONS IN THE SIERRA NEVADA MOUNTAINS OF CALIFORNIA,
Natural Resources Management Corp., Berkeley, Calif.
For primary bibliographic entry see Field 03F.
W74-01680

ERTS-1 IMAGERY AND HIGH FLIGHT PHOTOGRAPHS AS AIDS TO FIRE HAZARD APPRAISAL AT THE NASA SAN PABLO RESERVOIR TEST SITE,
California Univ., Berkeley. Space Sciences Lab.
For primary bibliographic entry see Field 04A.
W74-01681

PHENOLOGY SATELLITE EXPERIMENT,
Cornell Univ., Ithaca, N.Y. Div. of Atmospheric Sciences.
For primary bibliographic entry see Field 04A.
W74-01682

FOREST AND RANGE MAPPING IN THE HOUSTON AREA WITH ERTS-1 DATA,
Lockheed Electronics Co., Inc., Houston, Tex. Houston Aerospace Systems Div.
For primary bibliographic entry see Field 04A.
W74-01683

APPLICATION OF ERTS-1 DATA TO ANALYSIS OF AGRICULTURAL CROPS AND FORESTS IN MICHIGAN,
Michigan Agricultural Experiment Station, East Lansing.
For primary bibliographic entry see Field 03F.
W74-01684

CROP SPECIES RECOGNITION AND MENSURATION IN THE SACRAMENTO VALLEY,
Environmental Research Inst. of Michigan, Ann Arbor.
For primary bibliographic entry see Field 03F.
W74-01685

THE RESULTS OF AN AGRICULTURAL ANALYSIS OF THE ERTS-1 MSS DATA AT THE JOHNSON SPACE CENTER,
National Aeronautics and Space Administration, Houston, Tex. Lyndon B. Johnson Space Center.
For primary bibliographic entry see Field 03F.
W74-01686

AGRICULTURAL APPLICATIONS OF ERTS-1 DATA,
California Univ., Berkeley. Forestry Remote Sensing Lab.
For primary bibliographic entry see Field 03F.
W74-01687

IDENTIFICATION OF AGRICULTURAL CROPS BY COMPUTER PROCESSING OF ERTS MSS DATA,
Purdue Univ., Lafayette, Ind. Lab. for Applications of Remote Sensing.
For primary bibliographic entry see Field 03F.
W74-01688

IDENTIFICATION AND MAPPING OF SOILS, VEGETATION, AND WATER RESOURCES OF LYNN COUNTY, TEXAS BY COMPUTER ANALYSIS OF ERTS MSS DATA,
Purdue Univ., Lafayette, Ind. Lab. for Applications of Remote Sensing.
For primary bibliographic entry see Field 03F.
W74-01689

EVALUATION OF ERTS-1 IMAGERY FOR GEOLOGICAL SENSING OVER THE DIVERSE GEOLOGICAL TERRANES OF NEW YORK STATE,
Geological Survey, Albany, N.Y.; and New York State Museum and Science Service, Albany.
For primary bibliographic entry see Field 07C.
W74-01690

ANALYSIS AND APPLICATION OF ERTS-1 DATA FOR REGIONAL GEOLOGICAL MAPPING,
Pennsylvania State Univ., University Park. Dept. of Geosciences.
For primary bibliographic entry see Field 07C.
W74-01691

GEOLOGY OF UTAH AND NEVADA BY ERTS--1 IMAGERY,
Utah Univ., Salt Lake City. Dept. of Geological and Geophysical Sciences.
For primary bibliographic entry see Field 07C.
W74-01692

PRELIMINARY GEOLOGIC APPLICATION OF ERTS-1 IMAGERY IN ALASKA,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 07C.
W74-01693

A COMPARISON OF GEMINI AND ERTS IMAGERY OBTAINED OVER SOUTHERN MOROCCO,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
For primary bibliographic entry see Field 07C.
W74-01694

CAPABILITY OF ERTS-1 IMERGY TO INVESTIGATE GEOLOGICAL AND STRUCTURAL FEATURES IN A SEDIMENTARY BASIN (BASSIN PARISIEN, FRANCE),
Bureau de Recherches Geologiques et Minieres, Orleans (France). Departement Carte Geologique et Geologie Generale.
For primary bibliographic entry see Field 03F.
W74-01695

APPLICATION OF ERTS-1 MULTISPECTRAL IMAGERY TO MONITORING THE PRESENT EPISODE OF ACCELERATED EROSION IN SOUTHERN ARIZONA,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 02J.
W74-01696

A STUDY OF MORPHOLOGY, PROVENANCE, AND MOVEMENT OF DESERT SAND SEAS IN AFRICA, ASIA, AND AUSTRALIA,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 07C.
W74-01697

ESTABLISHMENT, TEST, AND EVALUATION OF A PROTOTYPE VOLCANO-SURVEILLANCE SYSTEM,
National Center for Earthquake Research, Menlo Park, Calif.
P. Ward, J. P. Eaton, E. Endo, D. Harlow, and D. Marquez.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentation, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 305-315, 1973. 5 fig, 1 tab, 10 ref.

Descriptors: *Remote sensing, *Telemetry, *Volcanoes, *Satellites (Artificial), *Monitoring, *Earthquake, Seismographs, Instrumentation, Warning systems, Surveys, Data collections, Data processing.
Identifiers: ERTS.

A volcano-surveillance system utilizing 23 miltilevel earthquake counters and 6 biaxial borehole tiltmeters is being installed and tested on 15 valcanoes in 4 states and 4 foreign countries. The purpose of this system is to give early warning when apparently dormant valcanoes are becoming active. The data are relayed through the ERTS-Data Collection System to Menlo Park for analysis. Installation was completed on 1972 on the volcanoes St. Augustine and Iliamna in Alaska, Kilauea in Hawaii, Baker, Rainier and St. Helens in Washington, Lassen in California, and at a site near Reykjavik, Iceland. Installation continues and should be completed in April 1973 on the volcanoes Santiaguito, Fuego, Agua and Pacaya in Guatemala, Izalco in El Salvador and San Cristobal, Telica and Cerro Negro in Nicaragua. (See also W74-01663) (Knapp-USGS)
W74-01698

SATELLITE GEOLOGICAL AND GEOPHYSICAL REMOTE SENSING OF ICELAND--PRELIMINARY RESULTS FROM ANALYSIS OF MSS IMAGERY,
Geological Survey, Reston, Va. EROS Program Office.
For primary bibliographic entry see Field 02C.
W74-01699

PRELIMINARY ASSESSMENT OF GEOLOGICAL APPLICATIONS OF ERTS-1 IMAGERY FROM SELECTED AREAS OF THE CANADIAN ARTIC,
Gregory Geoscience Ltd., Ottawa (Ontario).
For primary bibliographic entry see Field 02C.
W74-01700

EXPLOITATION OF ERTS-1 IMAGERY UTILIZING SNOW ENHANCEMENT TECHNIQUES,
Earth Satellite Corp., Washington, D.C.
For primary bibliographic entry see Field 02C.
W74-01701

MAPPING QUATERNARY LANDFORMS AND DEPOSITS IN THE MIDWEST AND GREAT PLAINS BY MEANS OF ERTS-1 MULTISPECTRAL IMAGERY,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 07C.
W74-01702

GLACIATION OF NORTHERN WYOMING INTERPRETED FROM ERTS-1,
Wyoming Univ., Laramie. Dept. of Geology.
For primary bibliographic entry see Field 02C.
W74-01703

FIRST-LOOK ANALYSIS OF GEOLOGIC GROUND PATTERNS ON ERTS-1 IMAGERY OF MISSOURI,
Geological Survey, Rolla, Mo.
For primary bibliographic entry see Field 07C.
W74-01704

RATIO MAPS OF IRON ORE DEPOSITS, ATLANTIC CITY DISTRICT, WYOMING,
Environmental Research Inst. of Michigan, Ann Arbor.
For primary bibliographic entry see Field 07C.
W74-01705

USE OF ERTS-1 IMAGES IN THE SEARCH FOR PORPHYRY COPPER DEPOSITS IN PAKISTANI BALUCHISTAN,
Geological Survey, Washington, D.C.

For primary bibliographic entry see Field 07C.
W74-01706

RELATION OF ERTS-1 DETECTED GEOLOGIC STUCTURE TO KNOWN ECONOMIC ORE DEPOSITS,
Stanford Univ., Calif. Dept. of Geology.
For primary bibliographic entry see Field 07C.
W74-01707

PRELIMINARY GEOLOGIC INVESTIGATIONS IN THE COLORADO PLATEAU USING ENHANCED ERTS IMAGES,
Jet Propulsion Lab., Pasadena, Calif.
For primary bibliographic entry see Field 07C.
W74-01708

STRUCTURAL GEOLOGICAL ANALYSIS OF NEVADA USING ERTS-1 IMAGES: A PRELIMINARY REPORT,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W74-01709

REGIONAL TECTONIC CONTROL OF TERTIARY MINERALIZATION AND RECENT FAULTING IN THE SOUTHERN BASIN RANGE PROVINCE, AN APPLICATION OF ERTS-1 DATA,
Argus Exploration Co., Newport Beach, Calif.
For primary bibliographic entry see Field 07C.
W74-01710

ERTS APPLICATIONS IN EARTHQUAKE RESEARCH AND MINERAL EXPLORATION IN CALIFORNIA,
Rockwell International Corp., Thousand Oaks, Calif. Science Center.
For primary bibliographic entry see Field 07C.
W74-01711

SOME ASPECTS OF ACTIVE TECTONISM IN ALASKA AS SEEN ON ERTS-1 IMAGERY,
Alaska Univ., College. Geophysical Inst.
For primary bibliographic entry see Field 07C.
W74-01712

VISUAL RECORDER FOR ENERGIZE-DEENERGIZE CYCLES,
Agricultural Research Service, Mandan, N. Dak. Northern Great Plains Research Center.
L. C. Benz, E. J. Doering, and D. E. Dubuque.
Soil Sci Soc Am Proc. Vol 36, No 6, p 968. 1972, Illus.
Identifiers: *Drainage, *Energize-denergize cycle, Instrumentation, Pump, *Visual recorders.

A water stage recorder was modified to give a continuous visual record of energize-deenergize cycles. This type of system can be used wherever and whenever it is necessary to have a visual record of events showing how equipment or a process is functioning. (This system worked well in a pump drainage experiment.)--Copyright 1973, Biological Abstracts, Inc.
W74-01771

COMPARATIVE STUDY BETWEEN THE EVAPORATION CALCULATED BY VARIOUS FORMULAS AND PAN EVAPORATION MEASURED IN THREE TROPICAL AREAS, (IN SPANISH),
Narino Univ., Pasto (Columbia). Facultad de Ciencias Agriculturas.
For primary bibliographic entry see Field 02D.
W74-01870

COMPOUND WEIR STUDY, (IN CHINESE)
Taipei Hydraulic Research Lab., (Taiwan).
For primary bibliographic entry see Field 02E.
W74-01875

OCEAN CURRENT MONITORING EMPLOYING A NEW SATELLITE SENSING TECHNIQUE,
National Environmental Satellite Service, Washington, D.C.
For primary bibliographic entry see Field 02E.
W74-01876

EVALUATION OF WATER PENETRATION PHOTOGRAPHY FOR BOTTOM SEDIMENT MAPPING IN LITTLE HARBOR, CATALINA ISLAND,
Geosource International Inc., Seal Beach, Calif. Geoscience Div.
D. T. Hodder.
Paper presented at American Society of Photogrammetry and American Society on Surveying and Mapping, Fall National Convention Symposium on Remote Sensing in Oceanography, October 2-5, 1973. 16 p, 7 fig, 5 ref.

Descriptors: *Mapping, *Bottom sediments, *Remote sensing, *California, Coasts, Methodology, Aerial photography, Photogrammetry, Data collections, Sampling, Sediments, Correlation analysis, Evaluation, Bathymetry.
Identifiers: *Multispectral photography.

An experiment is described to map bottom sediment types by remote sensing techniques. The specific techniques are narrow pass band (+ or - 100 angstroms) interference filtered photography, in the blue and green light regions. The coastal site chosen in California for the investigation is seasonally characterized by turbid waters of poor visibility and a nonuniform distribution of bottom sediment types. Both mass wasting and fluvial processes contribute to the bottom sediment types. This particular site was selected since an independent prior detailed mapping by conventional methods was available. On-site spectrophotometric measurements of upwelling and downwelling light were made during winter storm periods simultaneous with the photographic overflights. Sediment samples were collected to represent the available types and their reflectance spectra measured in the lab. The four bands of photography were then density sliced electronically to enhance the apparent contrast between bottom features. The agreement between remote sensing and classical bottom mapping was particularly good in the Little Harbor area. The only exceptions were the small clay pockets which were either too small to be resolved or washed away since the prior mapping. (Woodard-USGS)
W74-01949

REMOTE SENSING OF WATER POLLUTION AND PHYTOPLANKTON BY OPTICAL METHODS (DISTANTSIONNOYE OBNARUZHENIYE ZAGRYAZNENIY VODNYKH BASSEYNOV I FITOPLANKTONA OPTICHESKIMI METODAMI),
Leningrad State Univ. (USSR).
For primary bibliographic entry see Field 05A.
W74-01966

EXAMINATION OF POISSON DISTRIBUTED MEASURING VALUES (DIE UBERPRUFUNG POISSONVERTEILTER MESSWERTE),
Siemens und Halske A.G., Karlsruhe (West Germany).
R. Plesch.
Zeitschrift fur Analytische Chemie, Vol 265, No 2, p 114-121, June 14, 1973. 7 tab, 8 ref.

Descriptors: *Statistical methods, *Instrumentation, Equipment, Measurement.
Identifiers: *Poisson distribution, *Errors, Accuracy, Normal distribution.

The results of analytical measurement based on elementary events follow the poisson distribution which is derived from fundamental principles. In practice this distribution is converted into a singular normal distribution. By combining the properties of both distributions it is possible to state a quick examination of the statistical purity of a series of measurements with the aim to find out the existence and kind of troubles in measuring equipment. The criteria for determining a drift and an outlier in a series of measurements are treated. (Little-Battelle)
W74-01977

A NEW ELECTRICAL SOIL-MOISTURE MEASURING UNIT,
Michigan State Univ., East Lansing. Dept. of Soil Science.
For primary bibliographic entry see Field 02G.
W74-01978

A RECORDING DEVICE FOR MEASURING RESPIRATORY MOVEMENTS OF AQUATIC INSECTS,
Waterloo Lutheran Univ. (Ontario). Dept. of Biology.
For primary bibliographic entry see Field 02I.
W74-01996

THE RELATION BETWEEN MOISTURE MEASUREMENTS WITH A NEUTRON PROBE AND SOIL TEXTURE,
Hebrew Univ., Jerusalem (Israel).
For primary bibliographic entry see Field 02G.
W74-02074

THE ARCTIC DREDGE, A BENTHIC BIOLOGICAL SAMPLER FOR MIXED BOULDER AND MUD SUBSTRATES,
National Museum of Natural Sciences, Ottawa (Ontario).
For primary bibliographic entry see Field 02C.
W74-02085

OBSERVATIONS ON SAMPLING PRE-IMAGINAL POPULATIONS OF BLACKFLIES (DIPT., SIMULIIDAE) IN WEST CAMEROON,
R. H. L. Disney.
Bull Entomol Res. Vol 61, No 3, p 485-503. 1972. Illus.
Identifiers: *Black flies, Diptera, Larvae populations, *Sampling, *Simuliidae, *West Cameroon.

The use of standarized artificial substratum units (SASUs) for sampling preimaginal populations of Simulium is reviewed and the results then given of experiments with SASUs in rivers and artificial streams in West Cameroon in 1968-70. The increase of downstream drift of larvae by night is attributed to the increased activity of associated fauna at night. The numbers of larvae settling on SASUs is partly a function of how long the latter have been set and partly due to the pattern of fluctuation in river depth. Any particular SASU appears to be selective in relation to the different species of Simulium available for settlement. A new index of uniformity is proposed for comparing the diversity of Simulium faunas occurring on different substrata.--Copyright 1973, Biological Abstracts, Inc.
W74-02108

7C. Evaluation, Processing and Publication

SYMPOSIUM ON SIGNIFICANT RESULTS OBTAINED FROM THE EARTH RESOURCES TECHNOLOGY SATELLITE-1, VOL I--TECHNICAL PRESENTATIONS.
For primary bibliographic entry see Field 07B.
W74-01663

ERTS-1 DATA PRODUCT PREFORMANCE,
General Electric Co., Philadelphia, Pa. Space Systems Div.
B. T. Bachofer.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Report NASA SP-327, p 1-9, 1973. 11 fig.

Descriptors: *Remote sensing, *Satellites (Artificial), *Mapping, Calibrations, Data collections, Aerial photography.
Identifiers: *ERTS.

The quality of the products produced by the ERTS-1 system during its initial period of operations is, from a resolution and radiometric accuracy viewpoint, quite consistent with prelaunch estimates. In the geometric sense, these data products are somewhat better (and in a few cases considerably better) than prelaunch estimates. (See also W74-01663) (Knapp-USGS)
W74-01664

VEGETATIVE AND GEOLOGIC MAPPING OF THE WESTERN SEWARD PENINSULA, ALASKA, BASED ON ERTIS-1 IMAGERY,
Alaska Univ., College.
For primary bibliographic entry see Field 04A.
W74-01672

ERTS-1 EVALUATION OF NATURAL RESOURCES MANAGEMENT APPLICATIONS IN THE GREAT BASIN,
Nevada Univ., Reno. Remote Sensing Lab.
For primary bibliographic entry see Field 04A.
W74-01673

INTERPRETATION OF ERTS-MSS IMAGES OF A SAVANNA AREA IN EASTERN COLOMBIA.
Centro Interamericano de Fotointerpretacion, Bogota (Colombia).
For primary bibliographic entry see Field 02G.
W74-01677

FOREST AND RANGE MAPPING IN THE HOUSTON AREA WITH ERTS-1 DATA,
Lockheed Electronics Co., Inc., Houston, Tex. Houston Aerospace Systems Div.
For primary bibliographic entry see Field 04A.
W74-01683

IDENTIFICATION AND MAPPING OF SOILS, VEGETATION, AND WATER RESOURCES OF LYNN COUNTY, TEXAS BY COMPUTER ANALYSIS OF ERTS MSS DATA,
Purdue Univ., Lafayette, Ind. Lab. for Applications of Remote Sensing.
For primary bibliographic entry see Field 03F.
W74-01689

EVALUATION OF ERTS-1 IMAGERY FOR GEOLOGICAL SENSING OVER THE DIVERSE GEOLOGICAL TERRANES OF NEW YORK STATE,
Geological Survey, Albany, N.Y.; and New York State Museum and Science Service, Albany.
Y. W. Isachsen, R. H. Fakundiny, and S. W. Forster.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Voll--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 223-230, 1973. 2 fig, 7 ref.

Descriptors: *Remote sensing, *Satellites (Artificial), *Geologic mapping, *New York, Mapping, Structural geology, Topography, Geomorphology, Data collections, Data processing, Surveys.
Identifiers: ERTS.

Film positives of ERTS-1 imagery, both as received from NASA and photographically reprocessed, were analyzed by conventional and color additive viewing methods. The imagery reveals bedrock and surficial geological information at various scales. Features which can be identified to varying degrees include boundaries between major tectonic provinces, lithological contacts, foliation trends within massive gneisses, faults, and topographic lineaments. In New York the greatest amount of spectral geology is displayed in the Adirondack region where bedrock geology is strongly linked to topography. The majority of the faults and lineaments shown on the geologic map of New York at 1:250,000 appear in the ERTS imagery. In addition, many new linears were detected, as well as a number of anomalous curvilinear elements, some circular in plan and measuring up to 25 km in diameter which do not bear any strong relationship to mapped geological contacts. Surficial features observed in the imagery include glaciated valleys and cross channels, glacial streamline forms, ice marginal channels, and glacial lake deposits. (See also W74-01663) (Knapp-USGS)
W74-01690

ANALYSIS AND APPLICATION OF ERTS-1 DATA FOR REGIONAL GEOLOGICAL MAPPING,
Pennsylvania State Univ., University Park. Dept. of Geosciences.
D. P. Gold, R. R. Parizek, and S. A. Alexander.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 231-245, 1973. 2 fig, 35 ref.

Descriptors: *Remote sensing, *Satellites (Artificial), *Geologic mapping, Pennsylvania, Mapping, Structural geology, Topography, Geomorphology, Data collections, Data processing, Surveys, *Pennsylvania.
Identifiers: ERTS.

Combined visual and digital techniques of analysing ERTS-1 data for geologic information were tried in Pennsylvania. The major physiographic and structural provinces show up well. Supervised mapping following the imaged expression of known geologic features on ERTS data from parts of eastern Pennsylvania delimited the Diabase Sills and the Precambrian rocks of the Reading Prong with remarkable accuracy. From unsupervised mapping, transgressive linear features are apparent in unexpected density and exhibit strong control over river valley and stream channel directions. They are unaffected by bedrock type, age, or primary structural boundaries which suggests they are either rejuvenated basement joint directions on different scales or they are a recently impressed structure possibly associated with a drifting North American plate. (See also W74-01663) (Knapp-USGS)
W74-01691

GEOLOGY OF UTAH AND NEVADA BY ERTS--1 IMAGERY,
Utah Univ., Salt Lake City. Dept. of Geological and Geophysical Sciences.
M. L. Jensen.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 247-255, 1973. 3 fig.

Descriptors: *Remote sensing, *Satellites (Artificial), *Geologic mapping, *Utah, *Nevada, Mapping, Exploration, Surveys, Mineralogy, Limnology, Hydrology, Topography, Data collections.
Identifiers: ERTS.

ERTS-1 imagery covering Utah and Nevada is studied as an aid in structural geology, mineral exploration, and limnological and hydrological aspects. Limnological features of algal blooms and varying biological activities Utah Lake and the Great Salt Lake are evident on the imagery. Major structural breaks, lineages, or trends are abundant throughout the area of study. The correlation of positive aeromagnetic anomalies with the trends suggests near surface intrusive bodies, not yet exposed at the surface, that can be tested for possible associated mineralization. (See also W74-01663) (Knapp-USGS)
W74-01692

PRELIMINARY GEOLOGIC APPLICATION OF ERTS-1 IMAGERY IN ALASKA,
Geological Survey, Menlo Park, Calif.
E. H. Lathram, I. L. Tailleur, W. W. Patton, Jr., and W. A. Fischer.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 257-264, 1973. 4 fig, 7 ref.

Descriptors: *Remote sensing, *Satellites (Artificial), *Geologic mapping, *Alaska, Structural geology, Exploration, Mapping, Surveys.
Identifiers: ERTS.

Linears and faults on ERTS-1 images corroborate the existence of possible deep-seated structures first noted on Nimbus IV images. These structures may have influenced location of mineralization. ERTS images also display more comprehensively and explicitly than heretofore possible the thrust-faulted, complexly folded and open-folded terranes and strongly contrasting lithologies in northwestern Alaska, provide new data on faults in central Alaska, and display previously unknown lineations that suggest concealed folds in northern Alaska. The concealed folds are verifiable only by geophysical techniques and may be significant to petroleum exploration. (See also W74-01663) (Knapp-USGS)
W74-01693

A COMPARISON OF GEMINI AND ERTS IMAGERY OBTAINED OVER SOUTHERN MOROCCO,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
H. W. Blodget, and A. T. Anderson.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentation, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 265-272, 1973. 4 fig, 5 ref.

Descriptors: *Remote sensing, *Satellites (Artificial), *Geologic mapping, Structural geology, Exploration, Geology, Data collections, Aerial photography, Surveys.
Identifiers: ERTS, *Morocco.

A mosaic constructed from three ERTS MSS band 5 images enlarged to 1:500,000 compares favorably with a geologic map of southern Morocco and a Gemini 5 photo pair of all similar scale. A comparative plot of lineations and generalized geology on the three formats show that a significantly greater number of probable fractures are visible on the ERTS imagery than on the Gemini photography. Both orbital formats show several times more lineaments than were previously mapped. Definite structure-mineralization relationships exist; this defines underdeveloped areas which are prospective for mineralization. More detailed mapping is possible using MSS imagery than on Gemini 5 photographs, and in addition, the ERTS format is not restricted to limited coverage. (See also W74-01663) (Knapp-USGS)
W74-01694

CAPABILITY OF ERTS-1 IMERGY TO INVESTIGATE GEOLOGICAL AND STRUCTURAL FEATURES IN A SEDIMENTARY BASIN (BASSIN PARISIEN, FRANCE),
Bureau de Recherches Geologiques et Minieres, Orleans (France). Departement Carte Geologique et Geologic Generale.
For primary bibliographic entry see Field 03F.
W74-01695

A STUDY OF MORPHOLOGY, PROVENANCE, AND MOVEMENT OF DESERT SAND SEAS IN AFRICA, ASIA, AND AUSTRALIA,
Geological Survey, Denver, Colo.
E. D. McKee, C. S. Breed, and L. F. Harris.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 291-303, 1973. 2 ref.

Descriptors: *Remote sensing, *Satellites (Artificial), *Aerial photography, *Dunes, *Mapping, *Geomorphology, Provenance, Sediment transport, Deserts, Terrain analysis, Data collections, Data processing, Africa, Asia, Australia.
Identifiers: *Sand seas, ERTS.

Major types of desert sand seas are classified on the basis of morphologic pattern and lineation. For analyzing patterns of deposits on ERTS images (where the visible forms are mostly dune complexes rather than individual dunes) enhancement of imagery, differentiation of dune sand, recognition of atmospheric conditions, and study of the effect of varying sun angles and other seasonal influences upon interpretation of ERTS imagery are all being used. Further analyses and final checks are made by comparative studies of air photos or ground data available for each site. After completion of thematic maps portraying the pattern and lineation of sand bodies, data on directions and intensity of prevailing and other winds are plotted on corresponding bases, as a preliminary to determination of internal stuctures through ground truth. (See also W74-01663) (Knapp-USGS)
W74-01697

ESTABLISHMENT, TEST, AND EVALUATION OF A PROTOTYPE VOLCANO-SURVEILLANCE SYSTEM,
National Center for Earthquake Research, Menlo Park, Calif.
For primary bibliographic entry see Field 07B.
W74-01698

PRELIMINARY ASSESSMENT OF GEOLOGICAL APPLICATIONS OF ERTS-1 IMAGERY FROM SELECTED AREAS OF THE CANADIAN ARTIC,
Gregory Geoscience Ltd., Ottawa (Ontario).
For primary bibliographic entry see Field 02C.
W74-01700

MAPPING QUATERNARY LANDFORMS AND DEPOSITS IN THE MIDWEST AND GREAT PLAINS BY MEANS OF ERTS-1 MULTISPECTRAL IMAGERY,
Geological Survey, Denver, Colo.
R. B. Morrison, and G. R. Hallberg.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 353-361, 1973. 4 fig.

Descriptors: *Remote sensing, *Satellites (Artificial), *Geological mapping, *Geomorphology, Surveys, Mapping, Structural geology, Glacial drift, Alluvium, Quaternary period.
Identifiers: ERTS.

ERTS-1 multispectral images are effective for differentiating many kinds of Quaternary surficial deposits and landforms units in Illinois, Iowa, Missouri, Kansas, Nebraska, and South Dakota. Examples of features that have been distinguished are: the more prominent end moraines of the last glaciation; certain possible palimpsests of older moraines mantled by younger deposits; various abandoned river valleys, including suspected ones deeply filled by deposits; river terraces; and known faults and a few previously unmapped lineaments that may be faults. The ERTS images are being used for systematic mapping of Quaternary landforms and deposits in about 20 potential study areas. Some study areas, already well mapped, provide checks on the reliability of mapping from the images. For other study areas, previously mapped only partly or not at all, ERTS maps are the first comprehensive, synoptic ones, and should be useful for regional land use planning and groundwater, engineering geology and other environmental applications. (See also W74-01663) (Knapp-USGS)
W74-01702

FIRST-LOOK ANALYSIS OF GEOLOGIC GROUND PATTERNS ON ERTS-1 IMAGERY OF MISSOURI,
Geological Survey, Rolla, Mo.
W. H. Allen, J. A. Martin, and D. L. Rath.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 371-378. 2 fig, 15 ref.

Descriptors: *Remote sensing, *Satellite (Artificial), *Geologic mapping, Surveys, Data collections, Geomorphology, *Missouri, Structural geology.
Identifiers: ERTS.

Examination of ERTS-1 data for selected areas of Missouri revealed not only many of the known geologic features but also a number of unknown linear, circular and arcuate ground patterns. The number of new geologic elements that have been brought to light, as well as the sharp definition and probable extensions of several known geologic features, point out the importance of multispectral imagery via satellite and the synoptic views which they provide. To date, analysis and interpretations have been a first-look visual examination of the unenhanced projected images. (See also W74-01663) (Knapp-USGS)
W74-01704

RATIO MAPS OF IRON ORE DEPOSITS, ATLANTIC CITY DISTRICT, WYOMING,
Environmental Research Inst. of Michigan, Ann Arbor.
R. K. Vincent.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 379-386, 1973. 6 fig, 3 ref.

Descriptors: *Remote sensing, *Satellites (Artificial), *Exploration, *Surveys, *Geologic mapping, *Wyoming, Structural geology, Aerial photography, Iron, Data collections.
Identifiers: ERTS, *Iron ore deposits.

A spectral ratio techniques using ERTS data was tested in a region at the southern end of the Wind River Range, Wyoming. ERTS analog ratio images were found generally better than either ERTS single-channel images or high altitude aerial photos for discrimination of vegetation from nonvegetation. Some linear geological features smaller than the ERTS spatial resolution may be seen as clearly in ERTS ratio and single-channel images as in high altitude aerial photography. Geochemical information is extractable from ERTS data. Good preliminary quantitative agreement between ERTS-derived ratios and laboratory-derived reflectance ratios of rocks and minerals encourage plans to use lab data as training sets for a simple ratio gating logic approach to automatic recognition maps. Atmospheric corrections are needed to make the ratio method, and possibly other types of data processing, consistent over large geographical and temporal displacements. The ratio method, designed for geochemical prospecting and geologic mapping, should also be useful for other scientific applications from satellite data as well. (See also W74-01663) (Knapp-USGS)
W74-01705

USE OF ERTS-1 IMAGES IN THE SEARCH FOR PORPHYRY COPPER DEPOSITS IN PAKISTANI BALUCHISTAN,
Geological Survey, Washington, D.C.
R. G. Schmidt.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 387-394, 1973. 3 fig, 4 ref.

Descriptors: *Remote sensing, *Satellites (Artificial), *Geologic mapping, *Terrain analysis, Copper, Surveys, Exploration, Investigations, Mining, Data collections, Aerial photography.
Identifiers: ERTS, *Pakistan (Saindak), *Porphyry copper.

Geomorphic features related to a known porphyry copper deposit at Saindak, western Chagai District, Pakistan, are easily distinguished on ERTS-1 images. New geologic information from the images was used in conjunction with known geology to evaluate one previously known prospect area and to suggest two additional ones. The Saindak deposit is in an area of relatively easily eroded folded sedimentary and volcanic rocks. The deposit is characterized by an elongate zone of easily sulfide-rich rock surrounded by a resistant rim of hornfels and altered rock. Both this rim and the central sulfide-rich valley are conspicuous features on the images. A rim like that at Saindak does not form if regional metamorphism has increased the resistance of the country rock to erosion, as in the Pakistan-Iran border region northwest of Saindak. (See also W74-01663) (Knapp-USGS)
W74-01706

RELATION OF ERTS-1 DETECTED GEOLOGIC STUCTURE TO KNOWN ECONOMIC ORE DEPOSITS,
Stanford Univ., Calif. Dept. of Geology.
E. I. Rich.
In: Symposium on Significant Results Obtained from Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 395-402, 1973. 4 fig, 3 ref.

Descriptors: *Remote sensing, *Satellites (Artificial), *Mining, *Geologic mapping, *Structural geology, Mercury, Fractures (Geologic), *California, Data collections.
Identifiers: ERTS, Coast Ranges (Calif).

A preliminary analysis of ERTS-1 imagery of the Northern Coast Ranges and Sacramento Valley, California, has disclosed a potentially important fracture system which may be one of the controlling factors in the location of known mercury deposits in the Coast Ranges and which appears to be associated with some of the oil and gas fields within the Sacramento Valley. Recognition of this fracture system may prove to be an extremely useful exploration tool, hence careful analysis of subsequent ERTS imagery might delineate areas for field evaluation. (See also W74-01663) (Knapp-USGS)
W74-01707

PRELIMINARY GEOLOGIC INVESTIGATIONS IN THE COLORADO PLATEAU USING ENHANCED ERTS IMAGES,
Jet Propulsion Lab., Pasadena, Calif.
A. F. H. Goetz, F. C. Billingsley, D. Elston, I. Lucchitta, and E. M. Shoemaker.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 403-411, 1973. 4 fig, 9 ref.

Descriptors: *Remote sensing, *Satellites (Artificial), *Geologic mapping, *Hydrology, Structural geology, Terrain analysis, *Arizona, Data collections, Data processing, Groundwater.
Identifiers: ERTS, *Colorado Plateau.

Bulk and computer enhanced frames of the Verde Valley region of Central Arizona, an area which has been well mapped, were analyzed for structural information and rock unit identification. Most major rock units in areas of sparse ground cover are identifiable on enhanced false-color composites. Regional structural patterns are strikingly visible on the ERTS images. New features were identified which will aid in the search for goundwater near Flagstaff, Sedona, and Stewart Ranch. (See also W74-01633) (Knapp-USGS)
W74-01708

STRUCTURAL GEOLOGICAL ANALYSIS OF NEVADA USING ERTS-1 IMAGES: A PRELIMINARY REPORT,
Geological Survey, Washington, D.C.
L. C. Rowan, and P. H. Wetlaufer.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 413-423, 1973. 3 fig, 20 ref.

Descriptors: *Remote sensing, *Satellites (Artificial), *Geologic mapping, *Structural geology, *Mining, *Nevada, Volcanoes, Aerial photography, Exploration, Data collections.
Identifiers: ERTS.

Structural analysis of Nevada using ERTS-1 images shows several previously unrecognized lineaments which may be the surface manifestations of major fault or fracture zones. Principal trends are NE, NW, NNE-NNW, and ENE. Two lineament zones, the Walker Lane and Midas Trench lineament system, transect the predominantly NNE-NNW trending mountain ranges for more than 500 km. 50 circular features were delineated. Comparison with known Tertiary volcanic centers suggests 8 new centers. Preferred distribution of mines and Tertiary volcanic centers along some of the major lineaments suggests a genetic relationship. The intersection of these previously unmapped lineaments in northwestern Nevada is the location of a highly productive metallogenic district. In the Walker Lane, ENE-trending lineaments appear to be related to the occurrence of productive ore deposits. (See also W74-01663) (Knapp-USGS)
W74-01709

REGIONAL TECTONIC CONTROL OF TERTIARY MINERALIZATION AND RECENT FAULTING IN THE SOUTHERN BASIN RANGE PROVINCE, AN APPLICATION OF ERTS-1 DATA,
Argus Exploration Co., Newport Beach, Calif.
I. C. Bechtold, M. A. Liggett, and J. F. Childs.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics Space Admin Rept NASA SP-327, p 425-432, 1973. 6 fig, 14 ref.

Descriptors: *Remote sensing, *Satellites (Artificial), *Geologic mapping, *Exploration, Mining, Surveys, Data collections, California, Nevada, Arizona, Structural geology, Terrain analysis, Faults (Geologic), Volcanoes, Great Basin.
Identifiers: ERTS.

ERTS-1 imagery and field work in the southern Basin-Range Province of California, Nevada, and Arizona shows regional tectonic control of volcanism, plutonism, mineralization, and faulting. During the mid-Tertiary, the area was the site of plutonism and volcanism fed by fissure systems now exposed as dike swarms. Dikes, elongate plutons, and normal faults trend generally northward. Gold and silver mineralization is closely related to Tertiary igneous activity. Similarities in ore, structural setting, and rock types define a metallogenic district of high potential for exploration. The ERTS imagery also provides a basis for regional inventory of small faults which cut alluvium. This capability for efficient regional surveys of Recent faulting should be considered in land use planning, geologic hazards study, civil engineering and hydrology. (See also W74-01663) (Knapp-USGS)
W74-01710

ERTS APPLICATIONS IN EARTHQUAKE RESEARCH AND MINERAL EXPLORATION IN CALIFORNIA,
Rockwell International Corp., Thousand Oaks, Calif. Science Center.
M. Abdel-Gawad, and J. Silverstein.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol 1--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p433-450, 1973. 5 fig, 20 ref.

Descriptors: *Remote sensing, *Satellites (artificial), *Geologic mapping, *California, Structural geology, *Earthquakes, Faults (geologic), *Mining, Exploration, Investigations, Surveys, Data collections.
Identifiers: ERTS.

ERTS imagery can be effectively utilized to identify, locate, and map faults which show geomorphic evidence of geologically recent breakage. Several important faults not previously known have been identified. In parts of California, Sonora, Mexico, Arizona, and Nevada areas known for historic seismicity are often characterized by abundant evidence of recent fault and crustal movements. There are many examples of seismically quiet areas where outstanding evidence of recent fault movements is observed. ERTS-1 imagery could be effectively utilized to delineate areas susceptible to earthquake recurrence which, on the basis of seismic data alone, may be misleadingly considered safe. ERTS data can also be utilized in planning new sites in the geophysical network of fault movement monitoring and strain and tilt measurements. ERTS data on transverse faults and their interaction with the San Andreas system in west central California are providing significant scientific insights into the geological history of the state. Significant observations are described derived from the study of the fault pattern revealed in ERTS-1 imagery of the central part of the Pacific mountain system of California. The practical applications of this work relate directly to problems of earthquake hazards and mineral exploration. (See also W74-01663) (Knapp-USGS)
W74-01711

SOME ASPECTS OF ACTIVE TECTONISM IN ALASKA AS SEEN ON ERTS-1 IMAGERY,
Alaska Univ., College. Geophysical Inst.
L. D. Gedney, and J. D. VanWormer.
In: Symposium on Signifacant Results Obtained from the Earth Resources Technology Satellite-1: Vol 1--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 451-457, 1973. 2 fig, 7 ref.

Descriptors: *Remote sensing, Satellites (artificial), *Geologic mapping, *Structural geology, *Alaska, Earthqukes, Faults (GEOLOGIC), Surveys, Data collections, Hazards.
Identifiers: ERTS.

ERTS-1 imagery is useful in delineating structural features in Alaska which have never been recognized on the ground. Previously unmapped features such as seismically active faults and major structural lineaments are especially evident. Among the more significant results of this investigation is the discovery of an active strand of the Denali fault. The new fault has a history of scattered seismicity and was the scene of a magnitude 4.8 earthquake on October 1, 1972. Perhaps of greater significance is the disclosure of a large scale conjugate fracture system north of the Alaska Range. This fracture system appears to result from compressive stress radiating outward from around the outside of the great bend of the Alaska Range at Mt. McKinley. One member of the fracture system was the scene of a magnitude 6.5 earthquake in 1968. The potential value of ERTS imagery to land use planning is reflected in the fact that the site of the proposed bridge and oil pipline crossing of the Yukon River lies very near this fault. (See also W74-01663) (Knapp-USGS)
W74-01712

SURVEY OF INDUSTRIAL WASTE INJECTION WELLS, VOLUME III,
Missouri Univ., Rolla. Dept. of Geological Engineering.
For primary bibliographic entry see Field 05E.
W74-01714

ESTIMATING THE LAND SLOPE OF MOUNTAIN WATERSHEDS,
Forest Service (USDA), Moscow, Idaho. Forestry Sciences Lab.
For primary bibliographic entry see Field 02A.
W74-01715

FLOOD PLAIN INFORMATION, RABBIT CREEK, ANCHORAGE, ALASKA.
Army Engineer District, Anchorage, Alaska.
For primary bibliographic entry see Field 06F.
W74-01873

WATER RESOURCES DATA FOR TEXAS, 1971: PART 2. WATER QUALITY RECORDS.
Geological Survey, Austin, Tex.

Basic Data Report, 1973. 779 p, 4 tab, 21 ref.

Descriptors: *Water quality, *Sediment transport, *Chemical analysis, *Texas, Basic data collections, Surface waters, Sampling, Water temperature, Inorganic compounds, Nutrients, Bacteria, Physical properties, Water analysis, Chemical properties.

Water-quality records for Texas (1971 water year) include a description of the sampling station and tabulations of the samples analyzed. The description of the sampling station gives the location, drainage area, periods of record for the various water-quality data, extremes of the pertinent data, and general remarks. Data on the quality of surface water were collected from designated sampling sites at predetermined intervals such as once daily, weekly, monthly or less frequently. Water-quality information is presented for chemical, biochemical, and microbiological quality, water temperature, and fluvial sediment. Chemical quality includes concentrations of individual disolved constituents and certain properties or characteristics such as hardness, sodium adsorption ratio, specific conductance, and pH. The biochemical information includes qualitative and quantitative analyses of particulate inorganic and amorphous matter present. Microbiological information includes quantitative identification of cer-

tain bateriological indicator organisms. Water-temperature data represent once-daily observations except for stations where a continuous temperature recorder furnishes information from which daily minimums and maximums are obtained. Fluvial-sediment information is given for suspended-sediment discharges and concentrations and for particle-size distribution of suspended sediment and bed material. (Woodard-USGS)
W74-01885

GEOLOGY OF BURKE COUNTY, NORTH DAKOTA,
Geological Survey, Grand Forks, N. Dak.
For primary bibliographic entry see Field 02F.
W74-01923

COMPUTER SYSTEM FOR THE DESCRIPTION AND EVALUATION OF COMMUNITY WATER SYSTEMS BASED ON REVERSE OSMOSIS DESALINATION,
Digital Systems Corp., Hanover, N.H.
For primary bibliographic entry see Field 03A.
W74-01938

INDEX OF STREAM GAGING STATIONS IN AND ADJACENT TO CALIFORNIA, 1970,
California State Dept. of Water Resources, Sacramento.
For primary bibliographic entry see Field 02E.
W74-01943

ANNUAL COMPILATION AND ANALYSIS OF HYDROLOGIC DATA FOR LITTLE POND CREEK AND NORTH ELM CREEK, BRAZOS RIVER BASIN, TEXAS, 1971,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 04D.
W74-01950

ANNUAL COMPILATION AND ANALYSIS OF HYDROLOGIC DATA FOR HONEY CREEK, TRINITY RIVER BASIN, TEXAS, 1971,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 04D.
W74-01951

FLOOD PLAIN INFORMATION, KENAI RIVER, PHASE I, KENAI PENINSULA BOROUGH, ALASKA.
Army Engineer District, Anchorage, Alaska.
For primary bibliographic entry see Field 04A.
W74-01952

THE SIMULATION OF SUBSURFACE EFFECTS ON THE DIURNAL SURFACE THERMAL REGIME IN COLD REGIONS,
Michigan Univ., Ann Arbor. Dept. of Geography.
For primary bibliographic entry see Field 02C.
W74-01988

REPORT ON RELEASES OF RADIOACTIVITY IN EFFLUENTS AND SOLID WASTE FROM NUCLEAR POWER PLANTS FOR 1972.
Directorate of Regulatory Operations (AEC), Washington, D.C.
For primary bibliographic entry see Field 05B.
W74-02011

FLOOD PLAIN INFORMATION, PASCAGOULA-GAUTIER COASTAL AREAS, JACKSON COUNTY, MISSISSIPPI.
Army Engineer District, Mobile, Ala.
For primary bibliographic entry see Field 04A.
W74-02121

HYDROLOGIC REPORT LITTLE CALUMET RIVER AND TRIBUTARIES, PART I.
Horner and Shifrin, Inc., St. Louis, Mo.
For primary bibliographic entry see Field 02E.
W74-02127

ANNUAL COMPILATION AND ANALYSIS OF HYDROLOGIC DATA FOR COW BAYOU, BRAZOS RIVER BASIN, TEXAS, 1971,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 04D.
W74-02137

GROUND-WATER RESOURCES OF KLEBERG, KENEDY, AND SOUTHERN JIM WELLS COUNTIES, TEXAS,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 04B.
W74-02138

WATER-QUALITY RECORDS FOR SELECTED RESERVOIRS IN TEXAS, 1970-71 WATER YEARS,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 02K.
W74-02139

ANNUAL COMPILATION AND ANALYSIS OF HYDROLOGIC DATA FOR MUKEWATER CREEK, COLORADO RIVER BASIN TEXAS, 1971,
Geological Survey, Austin, Tes.
For primary bibliographic entry see Field 04D.
W74-02140

GROUNDWATER RESOURCES OF BLANCO COUNTY, TEXAS,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 04B.
W74-02141

GEOLOGY OF MOUNTRAIL COUNTY, NORTH DAKOTA,
Geological Survey, Grand Forks, N. Dak.
For primary bibliographic entry see Field 02F.
W74-02145

08. ENGINEERING WORKS

8A. Structures

ANALYSIS OF COAL REFUSE DAM FAILURE, MIDDLE FORK BUFFALO CREEK, SAUNDERS, WEST VIRGINIA--VOLUME 2, APPENDICES.
Wahler (W.A.) and Associates, Palo Alto, Calif.

Available from NTIS, Springfield, Va 22151 PB-215 143 Price $6.00 printed copy; $1.45 microfiche. Contract report, February 1973 (Vol 2 of 2 vol). 16 fig, 2 photo, 8 tab. USBM Contract S-0122084.

Descriptors: *Dam failure, *Coal mine wastes, *Floods, *West Virginia, *Flood damage, Data collections, Geologic investigations, Geological surveys, Rotary drilling, Sampling, Soil investigations, Permeability, Aerial photography, Mapping.
Identifiers: *Saunders (W Va), *Middle Fork Buffalo Creek (W Va).

On February 26, 1972, a coal refuse dam, owned and operated by the Buffalo Mining Company, failed near Saunders, W. Va. The immediate consequences of the flooding were 118 persons dead and 7 reported missing, the loss of over 500 homes, and extensive flood damage to other property in Buffalo Creek Valley. Basic data were gathered during the investigation of the Middle Fork Valley dams and refuse bank above Saunders during field investigations of the site conducted from the end of March through mid-September 1972. This information consisted of field mapping, subsurface exploration and sampling by means of auger drill holes, field density tests, field permeability tests, aerial photography, vane shear tests, and cone penetration tests. (See also W73-14163)
W74-01939

AN OLD PIPE LINE BROUGHT BACK TO LIFE,
Westchester County Water Agency, White Plains, N.Y.
For primary bibliographic entry see Field 08F.
W74-02134

8B. Hydraulics

THE ROLE OF MOLECULAR DIFFUSION IN DISPERSION THEORY,
Hebrew Univ., Jerusalem (Israel).
For primary bibliographic entry see Field 02E.
W74-01713

ANNUAL COMPILATION AND ANALYSIS OF HYDROLOGIC DATA FOR NORTH CREEK, TRINITY RIVER BASIN, TEXAS, 1971,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 04D.
W74-01884

ANNUAL COMPILATION AND ANALYSIS OF HYDROLOGIC DATA FOR PIN OAK CREEK, TRINITY RIVER BASIN, TEXAS, 1971,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 04D.
W74-01889

ANNUAL COMPILATION AND ANALYSIS OF HYDROLOGIC DATA FOR LITTLE POND CREEK AND NORTH ELM CREEK, BRAZOS RIVER BASIN, TEXAS, 1971,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 04D.
W74-01950

ANNUAL COMPILATION AND ANALYSIS OF HYDROLOGIC DATA FOR HONEY CREEK, TRINITY RIVER BASIN, TEXAS, 1971,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 04D.
W74-01951

WAVE DEFLECTING DEVICE FOR A SEA WALL,
Keller-Dee Research and Development Corp., Northbrook, Ill. (assignee).
D. F. Keller.
U. S. Patent No. 3,757,527, 4 p, 6 fig, 9 ref; Official Gazette of the United States Patent Office, Vol 914, No 2, p 448, September 11, 1973.

Descriptors: *Patents, *Shore protection, *Sea walls, Coastal structures, Engineering structures.
Identifiers: *Wave action.

The wave deflecting device is a plate mounted in each of the troughs of the sea wall with a flat surface of the plate lying on a first plane extending between a horizontal plane and a vertical plane of the wall. The plate is provided with a configuration to substantially conform to the cross section of the trough taken on the first plane so to block passage of water moving in the trough and to deflect the upwardly moving water in the trough which is caused by a wave back towards the body of water. One embodiment includes a lateral portion at one end of the plate which overlie adjacent ridges to

deflect water moving upwardly therealong back to the body of water. Each of the plates is provided with attachment means for mounting the plate in the trough of the wall on the first plane. (Sinha - OEIS)
W74-02035

COMPARISON OF SEWER DISCHARGE HYDROGRAPHS COMPUTED FROM IN--SEWER MEASUREMENTS AND FROM SYNTHESIZED HYDROGRAPH PROCEDURES, CITY OF ST. PAUL, MINNESOTA.
Horner and Shifrin, Inc., St. Louis, Mo.
For primary bibliographic entry see Field 05D.
W74-02135

8D. Soil Mechanics

FLOOD CONTROL PROJECT MAINTENANCE AND REPAIR -- 1971 INSPECTION REPORT,
California State Dept. of Water Resources, Sacramento.
J. MacClanahan, E. W. Danley, Jr., H. F. DeWitt, and W. Wolber.
Available from State of Calif, Documents Section, P.O. Box 20191 Sacramento, Calif. 95820 Price $1.00. Bulletin No. 149-71, June 1972. 29 p, 8 tab.

Descriptors: *Flood control, *Levees, *California, Engineering structures, Maintenance, Repairing, Channel improvement, Flood protection, Data collections.

In 1971, flood control levees extending 1,540 miles were maintained under cooperative state and federal agreements in the Sacramento and San Joaquin Valleys and in Lake and Placer Counties. Such flood control projects include the Sacramento, American, San Joaquin, Calaveras, and Truckee Rivers; Littlejohns and Middle Creeks; Merced County Stream Group; Sacramento River Bank Protection Project, and the Lower San Joaquin Flood Control Project; and the Fresno County Stream Group. Twice during 1971, Department of Water Resources specialists inspected and classified the quality of levee maintenance performed by maintaining agencies. This bulletin reports both the 1971 ratings and the method of rating, discusses proper maintenance procedures, and reports levee construction by the U.S. Army Corps of Engineers, channel maintenance, applications for levee encroachments, and the condition of the flood control project structures. Maps locate project levees and local maintenance agencies. (Woodard-USGS)
W74-01945

8F. Concrete

AN OLD PIPE LINE BROUGHT BACK TO LIFE,
Westchester County Water Agency, White Plains, N.Y.
G. J. Matt.
Paper presented at American Water Works Association Annual Meeting, Denver, Colorado, June 17, 1971. 12 p.

Descriptors: Pipelines, *Water conveyance, *Linings, *Sealants, Water loss, *Municipal water, New York, Water demand, Cements, Water distribution (Applied), Water supply development, Water supply, Water delivery, Water conveyance.
Identifiers: *Cement linings, *Pipeline restoration, *New York City.

An old pipe line, leaky and abandoned by New York City, was brought back to life through a concrete lining program in Westchester County. Built in 1881, the cast iron pipes were made without a lead notch and, because of this, were incapable of providing water under high pressure without developing leaks. But a test showed that a leak of 50 gallons per minute under a pressure of 50 psi could be eliminated with a concrete lining. This prevented all leaks up to 125 psi water pressure. Since th maximum pressure required for the pipe is less than 100 psi, it became feasible to restore this pipe to use. After the formation of a County Water District, the restoration of the water main was engineered and later accomplished. An unusual feature of the system is that New York City legally had to provide water to all communities in counties where it had a pipeline. Therefore, this line was already connected to communities in Westchester County although it had been abandoned by New York City and these communities. Yonkers, Mount Vernon, White Plains, Scarsdale and other cities may ultimetely be served in part by this renovated pipeline. (Partner)
W74-02134

8G. Materials

CALCIUM SULFATE SCALE CONTROL IN HIGH TEMPERATURE DESALTING PROCESSES,
California Univ., Los Angeles.
For primary bibliographic entry see Field 03A.
W74-01926

8I. Fisheries Engineering

SURVEY OF THE SOUTH CAROLINA OYSTER FISHERY,
South Carolina Wildlife and Marine Resources Dept., Charleston. Marine Resources Center.
For primary bibliographic entry see Field 06C.
W74-01830

SOME BIOLOGICAL CHARACTERISTICS OF A CHANNEL CATFISH POPULATION IN THE LOWER DES MOINES RIVER WITH AN EVALUATION OF POTENTIAL COMMERCIAL HARVEST,
Iowa State Conservation Commission, Des Moines. Fisheries Section.
For primary bibliographic entry see Field 06C.
W74-01833

THE DEVELOPMENT OF COMMERCIAL FOOD FISH POPULATIONS AT RED ROCK RESERVOIR DURING THE FIRST 3-YEARS OF IMPOUNDMENT,
Iowa State Conservation Commission, Des Moines. Fisheries Section.
For primary bibliographic entry see Field 06C.
W74-01834

ANADROMOUS FISH WATER REQUIREMENTS,
California State Dept. of Fish and Game, Sacramento.
J. L. Horton, and D. W. Rogers.
Available from NTIS, Springfield, Va 22151 as COM-73-10696. Contract Report for NOAA, National Marine Fisheries Service (Project AFC-7), June 1969. 13 p, 3 fig, 3 tab, 5 ref. Bureau of Fisheries Contract 14-17-007-746.

Descriptors: Water resources development, *Streams, *Spawning, *Salmon, *California, Correlation analysis, Streamflow, Flow rates, Streambeds, Physical properties, Gravels, Mapping, Reach (streams), Fisheries, Channel morphology.
Identifiers: Van Duzen River (Calif), Humboldt County (Calif).

A streamflow requirements study for king salmon spawning in the Van Duzen River in California was initiated on August 1, 1967 and completed on July 1, 1968. The objective was to provide an estimate of the amount of spawning area available at various streamflows to help evaluate the effects of possible water developments in the Van Duzen River basin. Two half-mile study sections were selected and areas containing good spawning gravel were mapped. Depths and velocities were measured over the areas of good gravel at various streamflows. These measurements were plotted on the maps. Areas of good gravel that met depth and velocity criteria were determined. Earlier surveys indicated that king salmon spawn throughout a 30-mile section of the river. The results of plotting depth and velocity data between 50 and 1,500cfs show that a discharge of 700 cfs over the study areas would provide the maximum amount of king salmon spawning area for the flows measured. Estimates from flow data indicate that a discharge of 770 cfs measured at the U.S. Geological Survey stream gage (Van Duzen River near Bridgeville) would provide an average of about 700 cfs over the 30-mile spawning area. (Woodard-USGS)
W74-01880

STAGES OF DEVELOPMENT OF YOUNG SALMON IN THE CHAIKEND SALMON-BREEDING FACILITY, (IN RUSSIAN),
P. M. Bagirova.
Izv Akad Nauk Az SSR Ser Biol Nauk. 2. p 83-87. 1972.
Identifiers: *Breeding facilities, *Mortality, *Salmon, USSR (Chaikend), *Water temperature.

Four different stages in the development of young salmon under the specific conditions prevailing in the Chaikend (USSR) salmon-breeding facility were distinguished. Massive death due to elevated water temperatures was observed. Young salmons reaching an age of 14-15 mo. thrive in waters with a salt content at a temperature of 10-15C.--Copyright 1973, Biological Abstracts, Inc.
W74-01901

A FEASIBILITY PILOT PROJECT FOR A METHOD OF OPEN WATER FISH FARMING.
Oceanic Inst. Waimanalo, Hawaii. Makajoo Oceanic Center.

Available from NTIS, Springfield, Va. 22151, as COM-72-11121 Price $3.00 printed copy, $1.45 microfiche. Final Report OI-72-78-1, June 1, 1972. 40 p. NOAA Sea Grant GH-78.

Descriptors: *Marine fisheries, *Fish farming, *Hawaii, Methodology, Marine biology, Plastic pipes, Nets, Ecosystems, Oceans, Coasts, Walls, Ponds, Engineering structures, Commercial fish, Economics, Maintenance costs, Evaluation.
Identifiers: *Undersea mariculture, *Salt-water ponds (Hawaii).

The final project report includes two separate reports. The first report describes sea bottom habitat enhancement; shellfish culture; production and trapping of detrital feeders, carnivores or herbivores; materials and methods; colonization of plastic strips; fish populations; and light regime. The second report discusses the costs involved in rebuilding walled coastal fish ponds and the economics of Hawaiian pond operation. (See also W74-01914 and W74-01915) (Woodard-USGS)
W74-01913

AN EXPERIMENT IN UNDERSEA MARICULTURE,
Oceanic Inst. Waimanalo, Hawaii. Makapuu Oceanic Center.
K. S. Norris, W. D. Madden, and P. S. Norris.
A Feasibility Pilot Project for a Method of Open Water Fish Farming Report OI-72-78-1, p 1-21, June 1, 1972. 4 fig, 2 tab, 9 ref. NOAA Sea Grant GH-78.

Descriptors: *Marine fish, *Marine fisheries, *Marine algae, *Oceans, *Fish farming, Methodology, Plastic pipes, Nets, Marine algae, Marine biology, Ecosystems, Marine plants, Data collections, Fish populations.
Identifiers: *Undersea mariculture.

The potentials of maricultural activity in moderate to deep ocean water below the turbulent zone are idsucssed. An experiment is described in which a 6 x 12.5 meter PVC pipe frame was anchored in 26 meters of water off Oahu, Hawaii, to which were attached 4500 2.5-meter long, 10-cm meter wide strips of two kinds of plastic (polyethylene and olefin) each with a buoyant bubble plastic border which floated the strips more or less vertically in the water. The course of microfloral and faunal establishment on this bed was followed for 5 months, as was invasion by local fishes. Algal growth quickly (3 weeks) reached maximum standing crop, though the composition of the biota fluctuated constantly throughout the test period. At maximum expression the biota was an incrustation of algal, colonies, diatom films, some barely visible foliose and branching colonies, including hydroids, flagellates, minute worms and molluscs, and a large complement of sea hares (Notarchus lineolatus), the largest organisms actually living on the plastic constantly. Heavy grazing both by passing fish and the hares was evident for most of the test period. Fish of 15 species gathered around or in the beds, with the density of grazing scarids and acanthurids increasing throughout the test. Possible economic potentials are discussed. (See also W74-01913) (Woodard-USGS)
W74-01914

REFURBISHING AN HAWAIIAN FISHPOND,
Oceanic Inst. Waimanalo, Hawaii. Makapuu Oceanic Center.
K. S. Norris, and J. J. Crouch.
In: A Feasibility Pilot Project for a Method of Open Water Fish Farming, Report OI-72-78-1, p 25-40, June 1, 1972. 4 fig, 2 tab, 5 ref. NOAA Sea Grant GH-78.

Descriptors: *Marine fisheries, *Sea water, *Ponds, *Hawaii, *Fish farming, Coasts, Engineering structures, Walls, Commercial fish, Economics, Evaluation, Planning, Maintenance costs.
Identifiers: *Salt-water ponds (Hawaii), Pond operation maintenance.

Approximately 200 stone-walled fishponds were built by early Hawaiians along the shores of the islands, chiefly on shallow reef flats. The majority of these ponds have fallen into decay from tidal wave damage, siltation and clogging with mangroves. But some are in a fair state of preservation and are still used for low-level production of mullet and milkfish. The ancient ponds are of much historic interest, and efforts have been made repeatedly to preserve the best as historical monuments. Most plans to refurbish the ponds and to reinstitute mullet and other mariculture have failed before repair has been completed. Still, the popularity of 'restoration' remains as a way to (1) assure the continued existence of the ponds in the face of land development, hotel and marina plans; and (2) provide a profitable commercial venture, especially considering the increasing cost of mullet. To test the economic feasibility of restoration, the refurbishment of a moderate-sized pond on Molokai Island for experimental culture of mullet and other pond organixms was undertaken. Total refurbishment of half the pond has required 18 months for completion and cost a total of $50,799. The details of refurbishment are described and costs are listed, with an idealized projection for the refurbishment and long-term operation of other ponds. (See also W71-01913) (Woodard-USGS)
W74-01915

OCCURRENCE OF EUBOTHRIUM CRASSUM (BLOCH, 1779) (CESTODA: - PSEUDOPHYLLIDEA) IN BROWN TROUT SALMO TRUTTA L., AND RAINBOW TROUT S. GAIRDNERI RICHARDSON, 1836, FROM HAMNINGFIELD RESERVOIR, ESSEX,
Marine Lab., Aberdeen (Scotland).
For primary bibliographic entry see Field 02H.
W74-02091

PARAMETERS INFLUENCING MINIMUM STREAMFLOW,
Wyoming Univ., Laramie. Water Resources Research Inst.
For primary bibliographic entry see Field 02E.
W74-02119

10. SCIENTIFIC AND TECHNICAL INFORMATION

10A. Acquisition And Processing

SUMMARIES OF FOREIGN GOVERNMENT ENVIRONMENTAL REPORTS.
Environmental Protection Agency, Washington, D.C. Library Systems Branch.
For primary bibliographic entry see Field 05G.
W74-01886

10B. Reference and Retrieval

THE SOUTHERN WATER RESOURCES SCIENTIFIC INFORMATION CENTER,
North Carolina State Univ., Raleigh. D. H. Hill Library.
W. C. Lowe, and S. S. Rose.
Southeastern Librarian, p 31-33, Spring 1973. OWRR A-999-NC (34). 14-31-0001-3833.

Descriptors: *Information retrieval, *Bibliographies, Publications, *North Carolina, *Southeast U.S., *Information exchange, Data, Collections, Data storage and retrieval, Documentation.

The Southern Water Resources Scientific Information Center, one of three regional centers of the Water Resources Scientific Information Center, is located at North Carolina State University. Characteristics of system and services available to potential users in the southeast U.S. are described. (Howells-North Carolina)
W74-02116

10C. Secondary Publication And Distribution

BIBLIOGRAPHY AND INDEX OF OKLAHOMA GEOLOGY--1972,
Geological Survey, Norman, Okla.
For primary bibliographic entry see Field 02F.
W74-01916

RADIOACTIVE WASTE MANAGEMENT, A BIBLIOGRAPHY OF PUBLICLY AVAILABLE LITERATURE PERTAINING TO THE USAEC'S SAVANNAH RIVER, S.C., PRODUCTION SITE.
Technical Information Center (AEC), Oak Ridge, Tenn.
For primary bibliographic entry see Field 05D.
W74-02008

RADIOACTIVE WASTE MANAGEMENT, A BIBLIOGRAPHY OF PUBLICLY AVAILABLE LITERATURE PERTAINING TO THE USAEC'S NATIONAL REACTOR TESTING STATION, IDAHO.
Technical Information Center (AEC), Oak Ridge, Tenn.
For primary bibliographic entry see Field 05D.
W74-02009

RADIOACTIVE WASTE MANAGEMENT, A BIBLIOGRAPHY OF PUBLICLY AVAILABLE LITERATURE PERTAINING TO THE USAEC'S OAK RIDGE, TENN. SITE.
Technical Information Center (AEC), Oak Ridge, Tenn.
For primary bibliographic entry see Field 05D.
W74-02010

ENVIRONMENTAL SCIENCE TECHNOLOGY INFORMATION RESOURCES,
For primary bibliographic entry see Field 06G.
W74-02100

10D. Specialized Information Center Services

THE SOUTHERN WATER RESOURCES SCIENTIFIC INFORMATION CENTER,
North Carolina State Univ., Raleigh. D. H. Hill Library.
For primary bibliographic entry see Field 10B.
W74-02116

10F. Preparation of Reviews

BIBLIOGRAPHY ON OPTIMIZATION OF IRRIGATION SYSTEMS,
Illinois Univ., Urbana. Dept. of Civil Engineering.
For primary bibliographic entry see Field 03F.
W74-01657

TOXICITY OF POWER PLANT CHEMICALS TO AQUATIC LIFE.
Battelle-Pacific Northwest Labs., Richland Wash.
For primary bibliographic entry see Field 05C.
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A LITERATURE REVIEW ON THE BIOLOGICAL PURIFICATION METHODS OF SEWAGE IN CHEMICAL-PHARMACEUTICAL PLANTS, (IN RUSSIAN),
Moskovskii Inzhenerno-Stroitelnyi Institut (USSR).
For primary bibliographic entry see Field 05D.
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THE NATIONAL WATER COMMISSION REPORT: A REVIEW,
Arizona Univ., Tuscon. Inst. of Government Research.
For primary bibliographic entry see Field 06E.
W74-01853

ECOLOGY OF SALT MARSHES AND SAND DUNES,
For primary bibliographic entry see Field 02L.
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WASTEWATER TREATMENT AND REUSE BY LAND APPLICATION - VOLUME II,
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Radioactive Waste Management, A Bibliography of Publicly Available Literature Pertaining to the USAEC'S National Reactor Testing Station, Idaho.
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- Ground and surface water hydrology at the Water Resources Division of the U. S. Geological Survey, U. S. Department of the Interior.
- Metropolitan water resources planning and management at the Center for Urban and Regional Studies of University of North Carolina.
- Eastern United States water law at the College of Law of the University of Florida.
- Policy models of water resources systems at the Department of Water Resources Engineering of Cornell University.
- Water resources economics at the Water Resources Center of the University of Wisconsin.
- Eutrophication at the Water Resources Center of the University of Wisconsin.
- Water resources of arid lands at the Office of Arid Lands Studies of the University of Arizona.
- Water well construction technology at the National Water Well Association.
- Water-related aspects of nuclear radiation and safety at the Oak Ridge National Laboratory.
- Water resource aspects of the pulp and paper industry at the Institute of Paper Chemistry.

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- Thermal pollution at the Department of Sanitary and Water Resources Engineering of Vanderbilt University.
- Wastewater treatment and management at the Center for Research in Water Resources of the University of Texas.
- Methods for chemical and biological identification and measurement of pollutants at the Analytical Quality Control Laboratory of the Environmental Protection Agency.
- Coastal pollution at the Oceanic Research Institute.
- Water treatment plant waste pollution control at American Water Works Association.
- Effect on water quality of irrigation return flows at the Department of Agricultural Engineering of Colorado State University.
- Agricultural livestock waste at East Central State College, Oklahoma.

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